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Sent: Thursday, November 1, 2018 6:36 AM

To: Liscio, Matthew P CIV SEA 04, NAVSEA DET RASO [matthew.liscio@navy.mil]

CC: Howard, Leslie A CIV NAVFAC SW [leslie.howard@navy.mil]; Fowler, Janet CIV NAVSEA, SEA 04N [janet.fowler1@navy.mil]; Johnson, Nels [Nels.Johnson@aptim.com]; Schul, Raymond [raymond.schul@aptim.com]; Amy Mangel [amy.mangel@aptim.com]; Hanelt, Norm [Norm.Hanelt@aptim.com]; Killpack, Randall [randall.killpack@aptim.com]; Chi, Minhsec [minhsec.chi@aptim.com]; Orman, Sean [sean.orman@aptim.com]; Rogers, Bryon [bryon.rogers@aptim.com]

Subject: [Non-DoD Source] Data package ready for review - HPNS PE-2, RSY C10 (DC)

Attachments: HPNS APTIM RSY C10 (DC) Soil Non-LLRW Concurrence Request 11012018 (redu....pdf

Mr. Liscio,

APTIM request RASO concurrence to designate this soil as Non-LLRW soil.

If there are any questions or if additional data is required, please contact me.

Thank you.

LAURA WHITTAKER

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Hunters Point Naval Shipyard, Parcel E-2 RSY Data Report

Contract No. EMAC III CTO-0013		
RSY Pad: C10	RSY Pad Use Number: Deconstruction (DC)	First Submittal <input checked="" type="checkbox"/> Second Submittal <input type="checkbox"/>
Data attached and submitted by: Laura Whittaker		Data Report Submittal Date: 11/01/2018

Soil Sample Data					
Sample Identification	Survey Location	Type of Sample	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Sr Final Analytical Results (pCi/g)
Upper limit of site reference background			1.633	0.113	0.331
PE2-RSYC10-DC-S001	1	Systematic	0.705	-0.0295	0.00911
PE2-RSYC10-DC-S002	2	Systematic	0.530	-0.0393	N/A
PE2-RSYC10-DC-S003	3	Systematic	0.648	0.00947	N/A
PE2-RSYC10-DC-S004	4	Systematic	0.564	-0.017	N/A
PE2-RSYC10-DC-S005	5	Systematic	0.602	-0.00174	N/A
PE2-RSYC10-DC-S006	6	Systematic	0.628	-0.0589	N/A
PE2-RSYC10-DC-S007	7	Systematic	0.494	-0.0622	N/A
PE2-RSYC10-DC-S008	8	Systematic	0.907	-0.0423	N/A
PE2-RSYC10-DC-S009	9	Systematic	0.318	-0.0219	N/A
PE2-RSYC10-DC-S010	10	Systematic	0.672	-0.0695	N/A
PE2-RSYC10-DC-S011	11	Systematic	0.526	-0.00149	-0.0208
PE2-RSYC10-DC-S012	12	Systematic	0.605	-0.0626	N/A
PE2-RSYC10-DC-S013	13	Systematic	0.521	-0.0310	N/A
PE2-RSYC10-DC-S014	14	Systematic	0.654	0.0202	N/A
PE2-RSYC10-DC-S015	15	Systematic	0.885	-0.0113	N/A
PE2-RSYC10-DC-S016	16	Systematic	0.782	-0.00365	N/A
PE2-RSYC10-DC-S017	17	Systematic	0.743	0.0113	N/A
PE2-RSYC10-DC-S018	18	Systematic	0.698	-0.0615	N/A
Biased Soil Sample Data					
PE2-RSYC10-DC-B-S001	1	Biased	0.633	-0.00773	0.00447
PE2-RSYC10-DC-B-S002	2	Biased	0.861	-0.0777	N/A
PE2-RSYC10-DC-B-S003	3	Biased	0.702	0.0153	N/A
PE2-RSYC10-DC-B-S004	4	Biased	1.060	-0.0465	N/A
PE2-RSYC10-DC-B-S005	5	Biased	0.698	0.0372	N/A
PE2-RSYC10-DC-B-S006	6	Biased	0.830	0.0213	N/A
PE2-RSYC10-DC-B-S007	7	Biased	0.643	0.0287	N/A

²²⁶Ra Radium-226
¹³⁷Cs Cesium-137
 Sr Strontium
 pCi/g Picocuries per gram

Instrument and Survey Data										
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #	Reference Area Static Bkgd	Reference Area Static 3σ IL	Reference Area Scan Bkgd	Reference Area Scan 3σ IL	Range
RSI Gamma Walkover Survey	HPRS-08312018-PE2-ROV2-2948	08/31/2018	RS-701/RSX-1	N/A	Console: 7236 Detectors: 5447,5448	N/A	N/A	3,400 CPS	4,842 CPS	3,675-4,996* CPS
RSI Follow-up Static Survey	HPRS-09192018-PE2-JSS2-2979	09/19/2018	RS-701/RSX-1	N/A	Console: 7236 Detectors: 5447,5448	3,612 CPS	4,255 CPS	N/A	N/A	4,281-5,039* CPS
Systematic Sample Survey	HPRS-09122018-PE2-JSS-2966	09/12/2018	2221	06/29/2019	117634	15,069 CPM	17,241 CPM	N/A	N/A	17,414-20,368* CPM
Biased Sample Survey	HPRS-09262018-PE2-JSS-2988	09/26/	2221	06/29/2019	117634	15,069 CPM	17,241 CPM	N/A	N/A	19,431-21,677* CPM

+ Gamma readings exceeding the Reference Area 3σ IL are attributable to the presence of naturally-occurring non-Navy program radionuclides in the excavated soil—see Note(s) in the Summary table (page 2) for more details.

3σ IL Investigation Level (established at 3σ above the mean of the Reference Area dataset)

CPS Counts per second

CPM Counts per minute

Summary

1) RSI gamma walkover survey and data review—upon review of initial scan data, follow-up static investigations were deemed necessary, and investigation locations were identified as per the RSI Data Evaluation Process (pages 3-4). Gamma scan coverage is shown on the Systematic Sample Survey map (page 8). Contour maps of scan data are shown on RSI Data Plots (page 5). Data review results are summarized on RSI Review Summary (page 6).

2) RSI Follow-up static survey—42 locations identified during the data review process were investigated. 32 follow-up locations exceeded the Reference Area static IL for regions of interests (ROIs) 6, 7, and/or 8 (VD1). Follow-up locations are shown on the RSI Follow-up Static Survey map (page 7).

Note: Gamma readings reported in the Instrument and Survey Data table (page 1) for the gamma walkover and follow-up static surveys show the mean gamma gross count rate range(ROI 10, VD1) for all surveyed follow-up locations. Spectral analysis results show 32 follow-up locations exceeded the Reference Area Static IL for regions of interests (ROI) 6, 7, and/or 8. Biased samples were collected at seven representative locations to support the evaluation of the elevated gamma readings.

Biased soil samples PE2-RSYC10-DC-B-S001-PE2-RSYC10-DC-B-S007 were collected and submitted for gamma spectroscopy analysis to further characterize the elevated soil readings at follow-up locations 9, 11, 16, 22, 31, 35, and 41 (see Summary Note 4 below).

3) Eighteen systematic soil samples (001-018) were obtained and submitted for gamma spectroscopy analysis. Sample locations for systematic samples are shown on the Systematic Sample Survey map (page 8). TestAmerica sample results are attached (pages 54-77).

Ten percent of the systematic and biased soil samples (three samples in total, PE2-RSYC10-DC-S001, PE2-RSYC10-DC-S011 & PE2-RSYC10-DC-B-S001) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 54-77 & 78-94).

4) Biased sample survey—samples PE2-RSYC10-DC-B-S001-PE2-RSYC10-DC-B-S007 were obtained and analyzed to support the evaluation of elevated gamma readings collected at follow-up locations 9, 11, 16, 22, 31, 35, and 41. Biased soil sample location are shown on the Biased Sample Survey map (page 9). TestAmerica sample results are attached (pages 78-94).

Note: Static gamma measurements collected at systematic and biased sample locations were obtained with a handheld Ludlum 2221 Scaler/Ratemeter and 3"x3" NaI probe; the results show gamma readings exceeding the instrument-specific Reference Area Static IL at several sample locations. Sample results indicate that this activity is due to the presence of naturally-occurring non-Navy program radionuclides in the excavated soil.

Conclusions:

All locations with elevated Z-scores identified by the RSI gamma walkover survey were determined to be consistent with background. 42 locations were investigated during the follow-up static survey, with 32 readings greater than the Reference Area static IL. Biased soil samples were collected at seven representative follow-up locations to support the evaluation of elevated gamma readings. Spectral analysis results and gamma static data for each region of interest (ROI) are provided (pages 10-51).

Final analytical results for systematic and biased samples from this RSY pad are concluded to be comparable to background. Histograms showing systematic soil sample activity concentrations are provided (pages 52-53). Ten percent of the systematic and biased soil samples (three samples in total, PE2-RSYC10-DC-S001, PE2-RSYC10-DC-S011 & PE2-RSYC10-DC-B-S001) were also analyzed for total strontium, with concentrations less than the Project Action Limit of 0.331 pCi/g, as shown in the Soil Sample Data table (page 1).

This data package characterizes the construction base layer for RSY C10 pad. The soil was initially import clean material.

APTIM request RASO concurrence to release this soil as Non-LLRW.

Disposition: This soil shall be dispositioned as non-LLRW waste. The soil will be stockpiled onsite for reuse following appropriate chemical characterization.

RSI Data Evaluation Process

RS-700 Mobile Radiation Monitoring System

- Self-contained gamma-ray radiation detection and monitoring system
- (2) RSX-1 4-liter NaI(Tl) gamma detectors oriented perpendicular to the direction of travel (VD1 denotes both detectors summed; VD3 refers to the left detector; and VD4 refers to the right detector)
- Multi-Channel Analyzer, allowing for monitoring of energy-specific regions of interest (ROIs)
- RadAssist survey software for control, monitoring, and recording

Ten ROIs have been established for radium and progeny, cesium, and cobalt, as well as other naturally-occurring or anthropogenic gamma-emitting radionuclides that may be of interest:

ROI	Description	Energy Range (keV)	Primary Peak (keV)
1	Total counts	411 – 2811	N/A
2	Potassium	1371 – 1569	1460
3	U/Ra-226	1659 – 1860	1764 (Bi-214)
4	Thorium	2409 – 2811	2614 (Tl-208)
5	Annihilation	456 – 570	511
6	Ra-226	546 – 666	609 (Bi-214)
7	Cs-137	600 - 720	662
8	Pb-214/Ra-226	327 – 399	351
9	Co-60	1085 - 1370	1173/1332
10	Gross Counts	24 – 2811	N/A

A tiered approach is used during data review to identify follow-up locations. Raw data are exported to a comma delimited format using RadAssist and imported into an Excel spreadsheet for review and analysis. The following review steps are completed to determine if additional follow-up measurements are necessary:

- **Playback Review:** The data file is replayed in RadAssist and reviewed for elevated count rates in ROIs 6, 7, 9, and 10 for virtual detector (VD) 1 (both detectors summed). The scan screen is also monitored for elevated count rates and alarms.
- **Count Rate Time Series Review:** The count rates for ROIs 6, 7, 9, and 10 for VDs 1, 3 (detector 1), and 4 (detector 2) are plotted in a time series and reviewed for additional peaks in count rate.
- **All ROIs:**
 - **Z-Scores:** The Z-Scores are calculated for each location in all ROIs for VDs 1, 3, and 4. Any location with four or more ROIs having a Z-Score greater than three ($Z > 3$) is marked for follow-up.
 - **Local Z-Scores:** Local Z-Scores are calculated using a moving average for each data point in all ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with four or more ROIs having a local $Z > 3$ is marked for follow-up.
 - **Semi-local Z-Scores:** Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with four or more ROIs having a semi-local $Z > 3$ is marked for follow-up.
- **ROIs 3, 6, 8, and 10 (radium-specific ROIs):**
 - **Z-Scores:** The Z-Scores are calculated for each location in the radium-specific ROIs for VDs 1, 3, and 4. Any location with three or more radium-specific ROIs having a $Z > 3$ is marked for follow-up.
 - **Local Z-Scores:** Local Z-Scores are calculated using a moving average for each data point in the radium-specific ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a local $Z > 3$ is marked for follow-up.
 - **Semi-local Z-Scores:** Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise

be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a semi-local $Z > 3$ is marked for follow-up.

- **ROI 7 (cesium-specific ROI):**
 - Z-Scores: Z-Scores are calculated for each location in ROI 7 for VDs 1, 3, and 4. Any location having a $Z > 3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 7 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local $Z > 3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 7 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local $Z > 3$ is marked for follow-up.
- **ROI 9 (cobalt-specific ROI):**
 - Z-Scores: Z-Scores are calculated for each location in ROI 9 for VDs 1, 3, and 4. Any location having a $Z > 3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 9 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local $Z > 3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 9 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local $Z > 3$ is marked for follow-up.
- **Z-Score Time Series Review:** The three types of Z-Scores for ROIs 6, 7, 9, and 10 for VDs 1, 3, and 4 are plotted in a time series and reviewed for additional peaks in Z-Scores.

Any location selected for follow-up or with a Z-Score > 3 in a radium-, cesium-, or cobalt-specific ROI will undergo spectral analysis to determine if it is statistically likely that there are ROC concentrations present at that location in quantities greater than background.

A background spectrum is subtracted from the local spectral data for a given location, and the resulting net spectrum is plotted. Critical levels, as defined in Section 6.7.1 of the Multi Agency Radiation Survey and Site Investigation Manual are calculated and plotted based on background levels. The critical level is the level, in counts, at which there is a statistical probability (with a predetermined confidence) of incorrectly identifying a measurement system background value as greater than background. Any response above this level is considered to be greater than background. The critical level is calculated for ROIs 6, 7, 8, and 9 according to the equation shown below:

Where:

$$L_C = 2.33\sqrt{B}$$

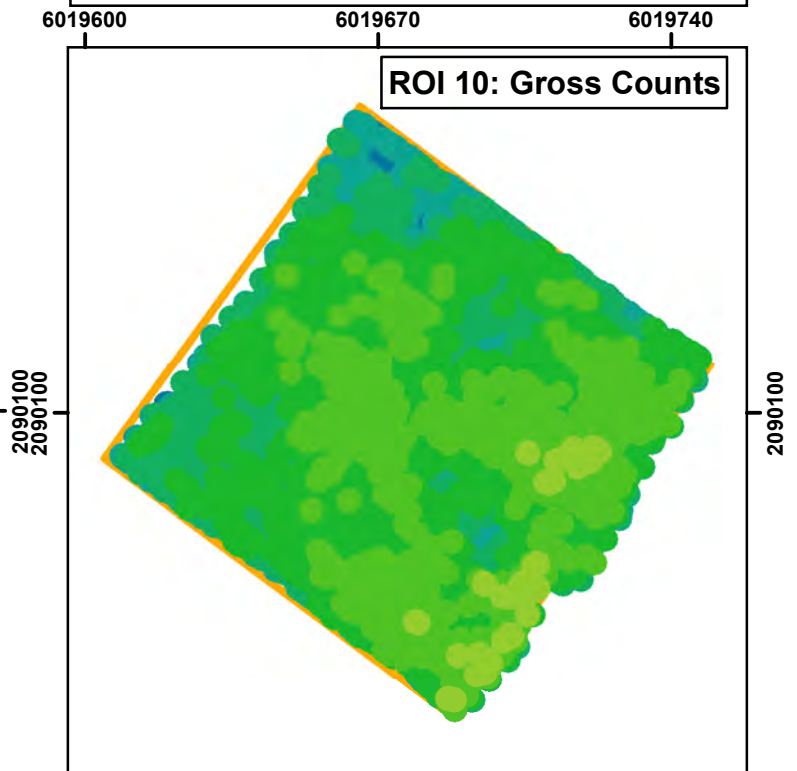
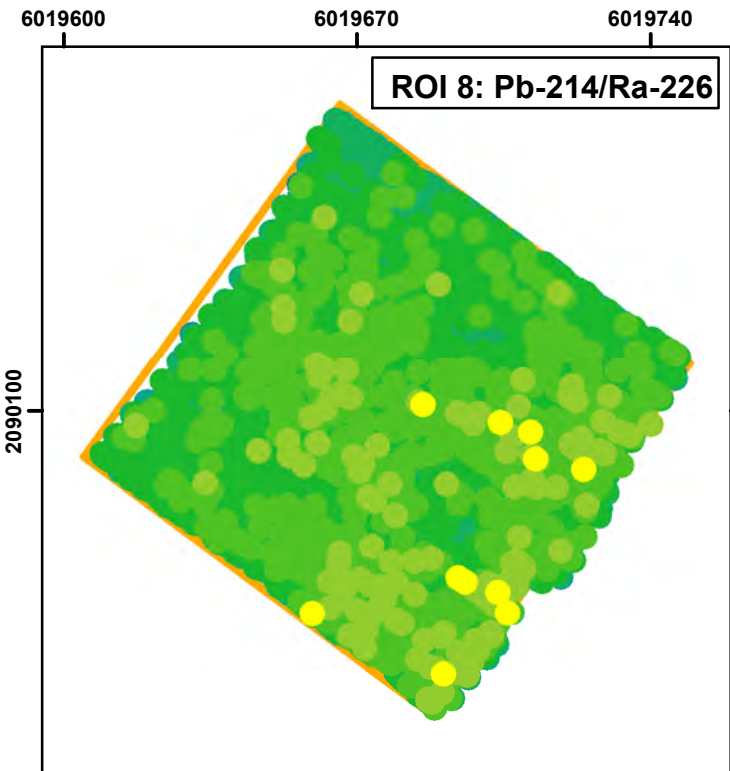
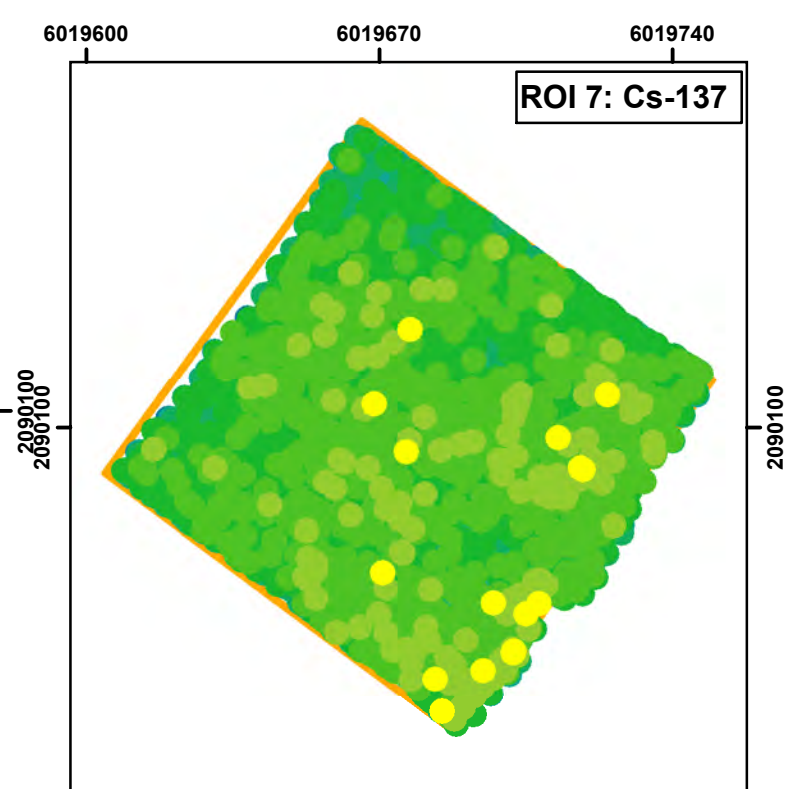
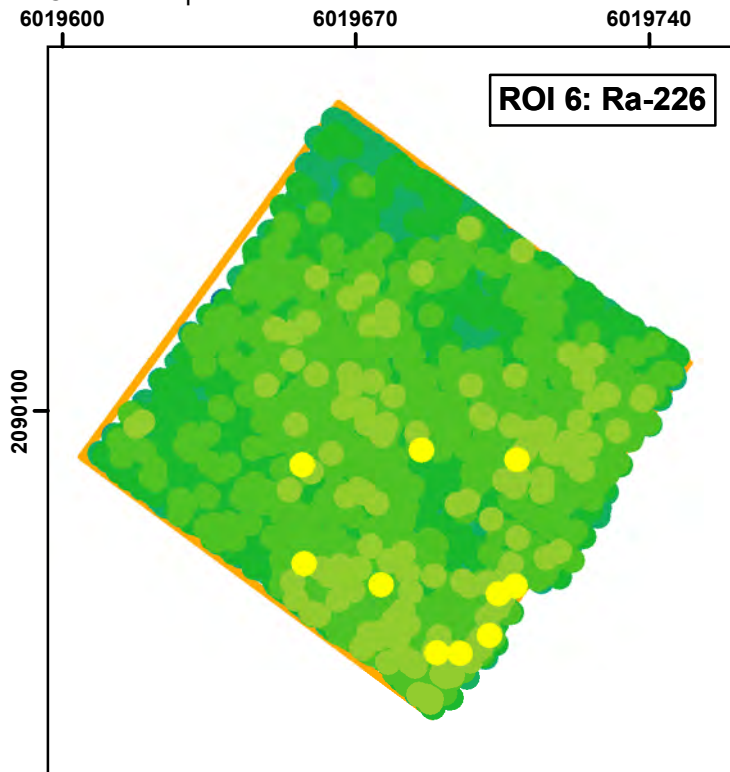
LC	=	critical level (counts)
B	=	average background in the ROI

When count rates in the net gamma spectrum at a given location do not exceed critical levels for any radium-, cesium-, or cobalt-specific energy ranges, it is unlikely that ROC concentrations exist at that location above background.

Any data point that is both above the critical level and within the energy range of a given ROI is considered above background for that radionuclide and will be flagged for further investigation in the field.

RSI Data Plots HPNS Parcel E-2 RSY Pad C10 Deconstruction

Contour Map



RS 700 Gamma Walkover Survey Data (VD1)



0 20 40 80 Feet

Coordinate system: CSP Zone III. NAD83, US Survey Foot



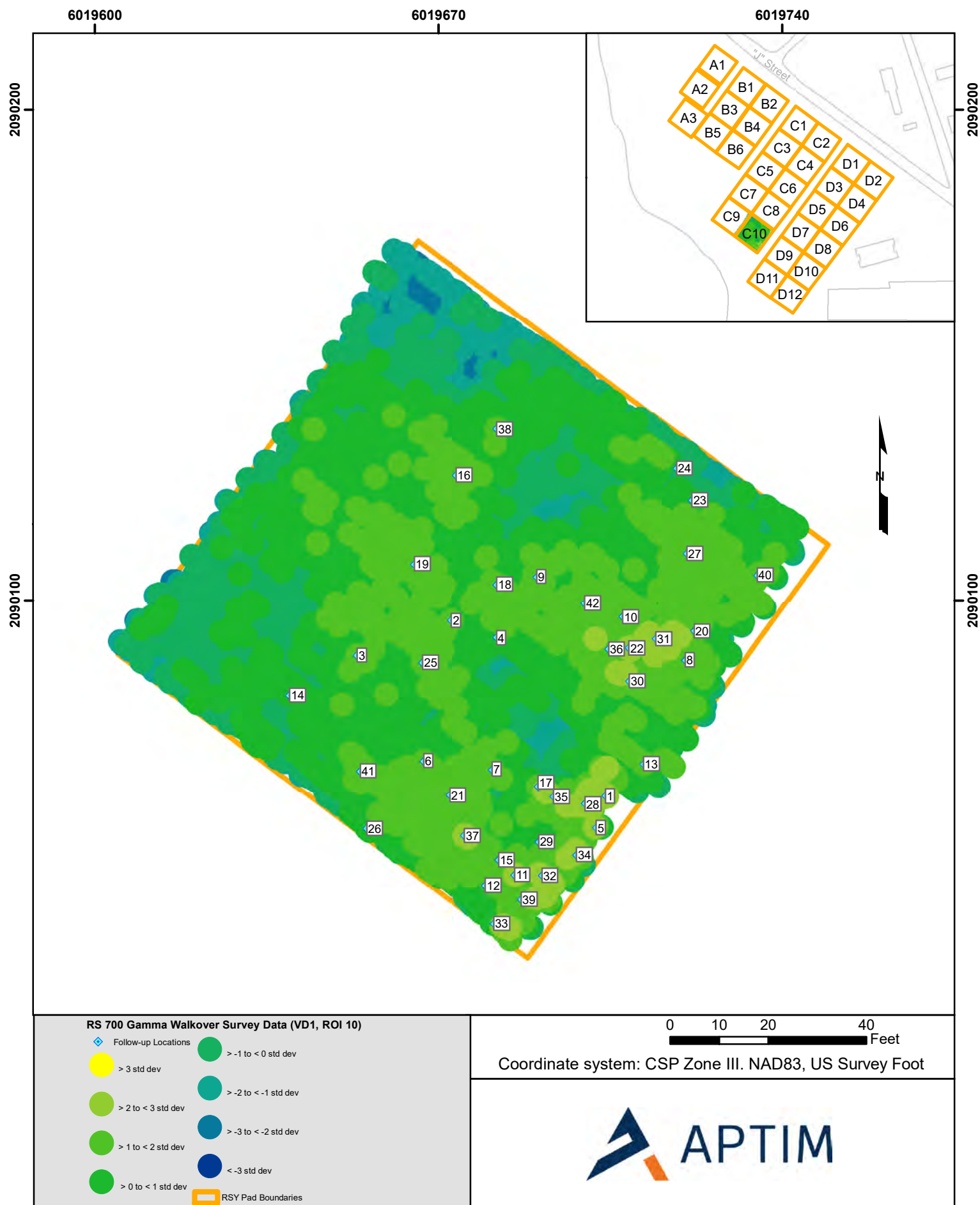
RSI Review Summary

Summary:

42 locations were initially selected for follow-up investigation. Locations were identified by elevated peaks noted in the playback review and/or time series charts, and by using the Z-Score, Local Z-Score, and Semi-Local Z-Score reviews as described in the RSI Data Evaluation Process on pages 3-4. Spectral analyses performed on 32 gamma static data locations exceeded the Reference Area Static IL for region of interest (ROIs) 6, 7, and/or 8. All other gamma static readings at follow-up locations were less than the Reference Area static IL for ROIs 3, 6, 7, and 8; figures for all locations are provided on pages 10-51.

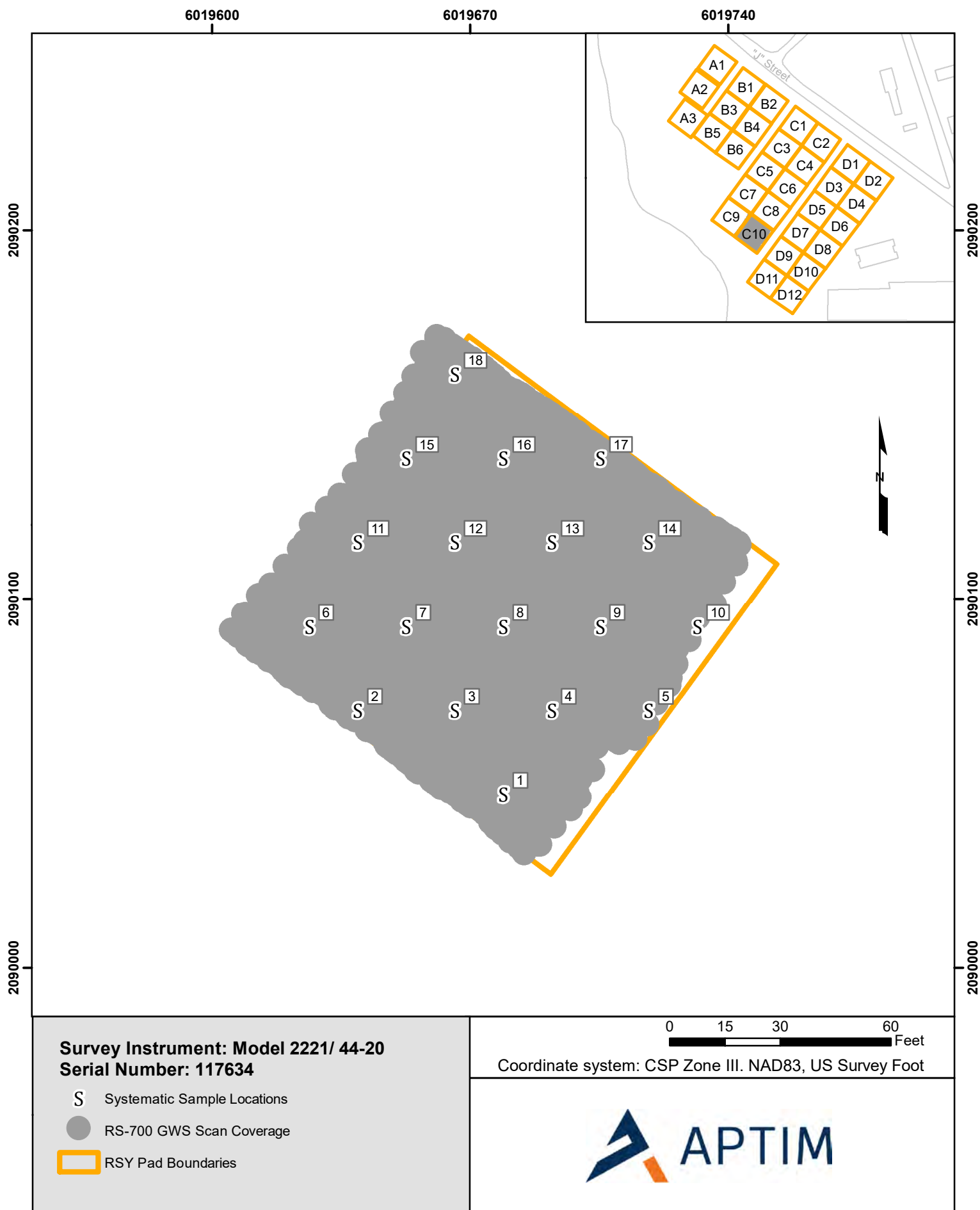
RSI Follow-up Static Survey
HPRS-09192018-PE2-JSS2-2979

HPNS Parcel E-2 RSY Pad C10 (DC)



Systematic Sample Survey
HPRS-09122018-PE2-JSS-2966

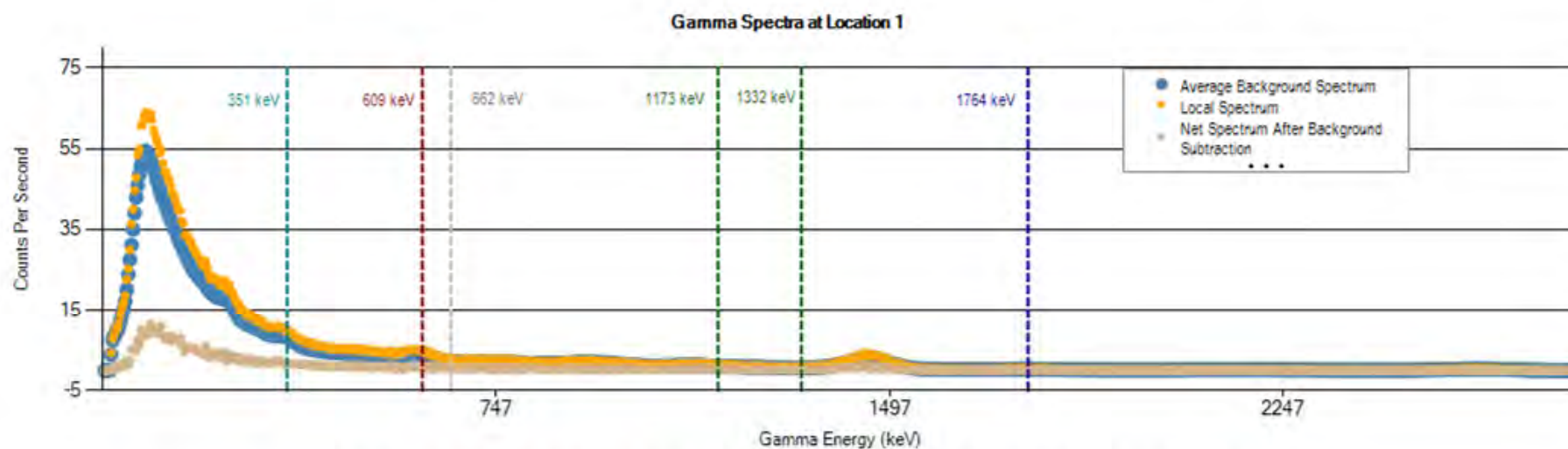
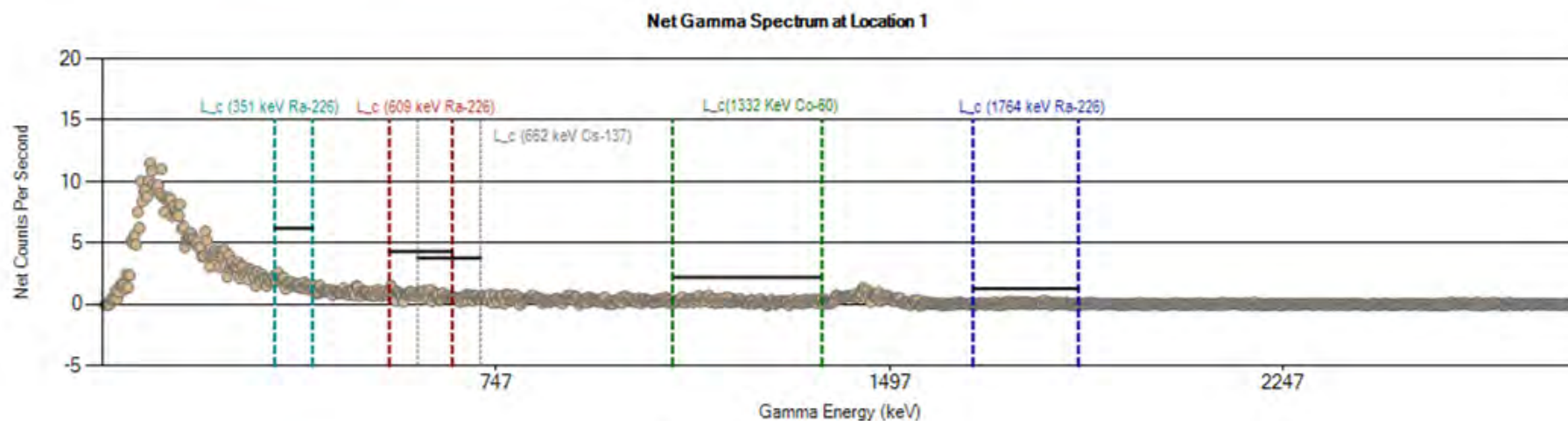
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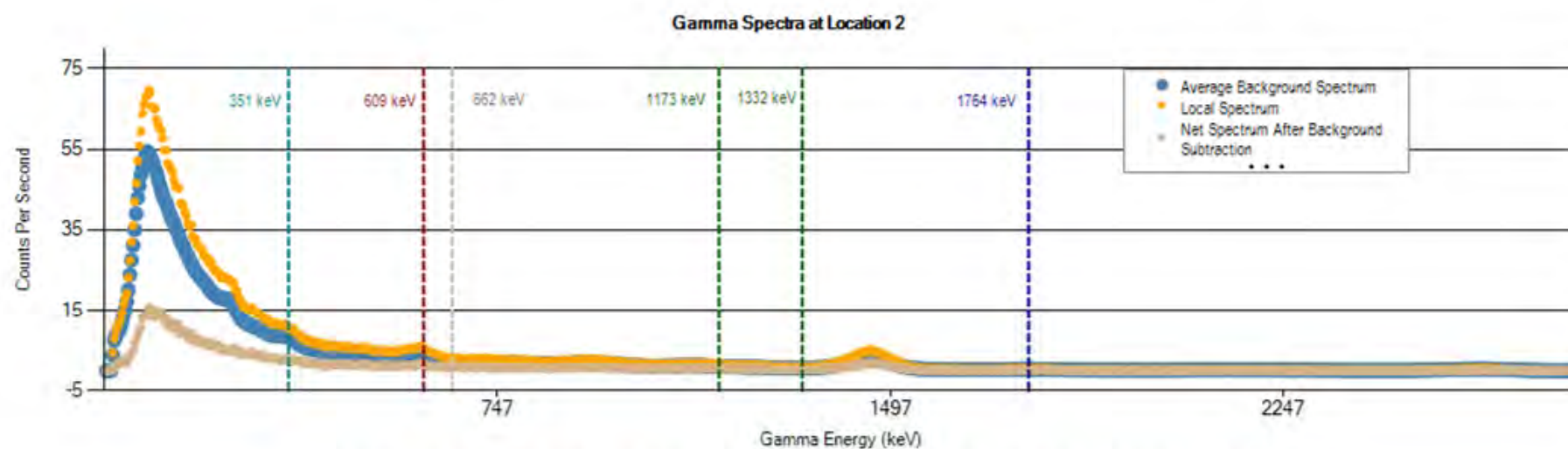
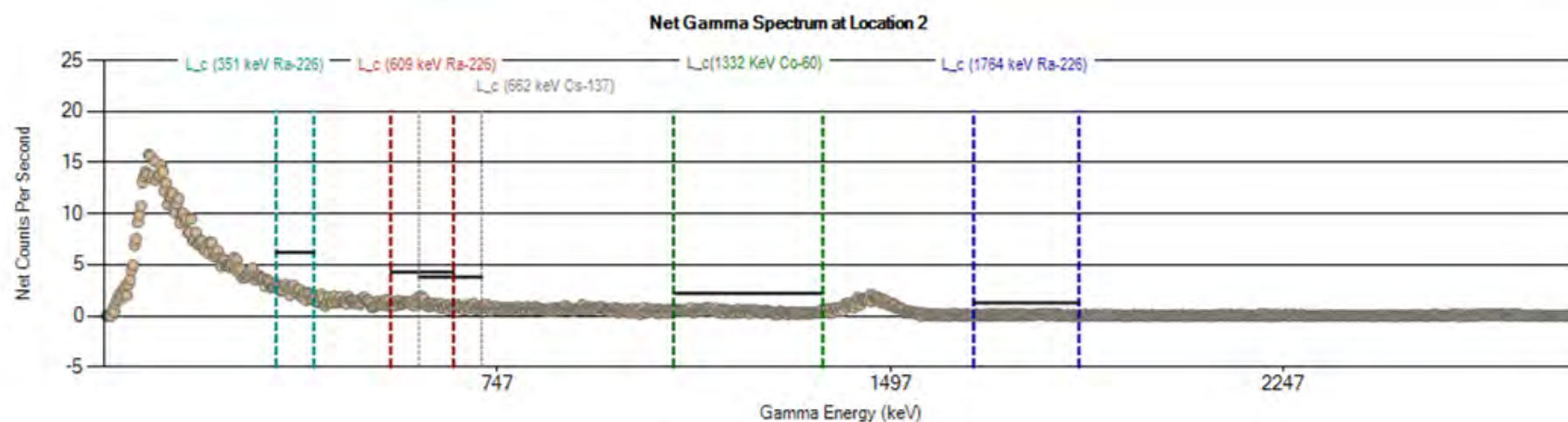
Biased Sample Survey
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HPNS Parcel E-2 RSY Pad C10-DC

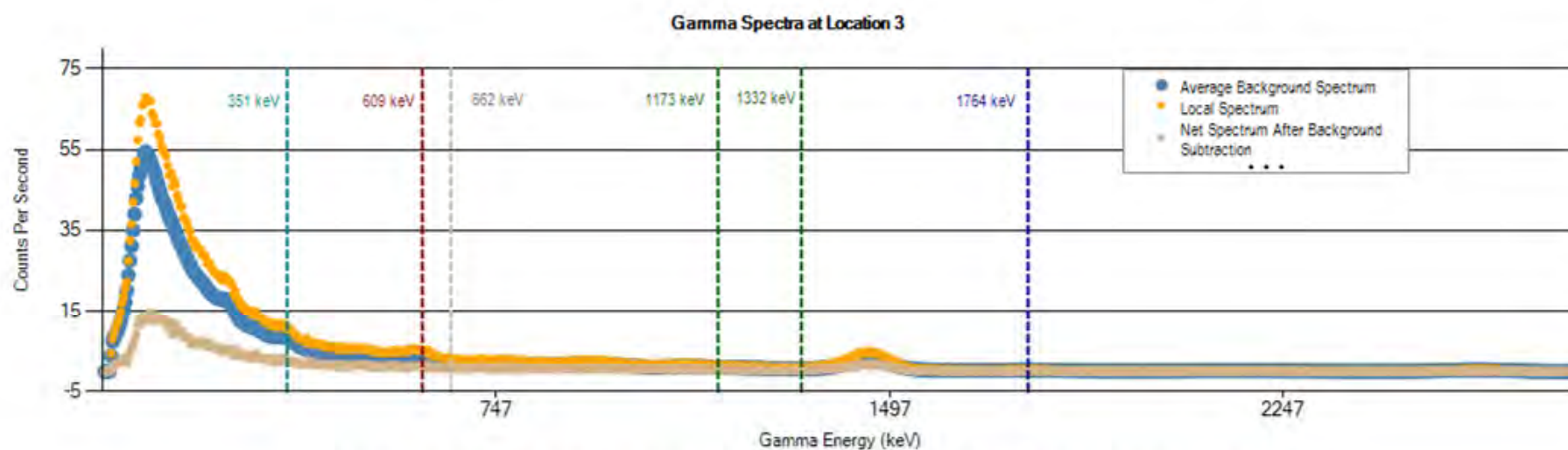
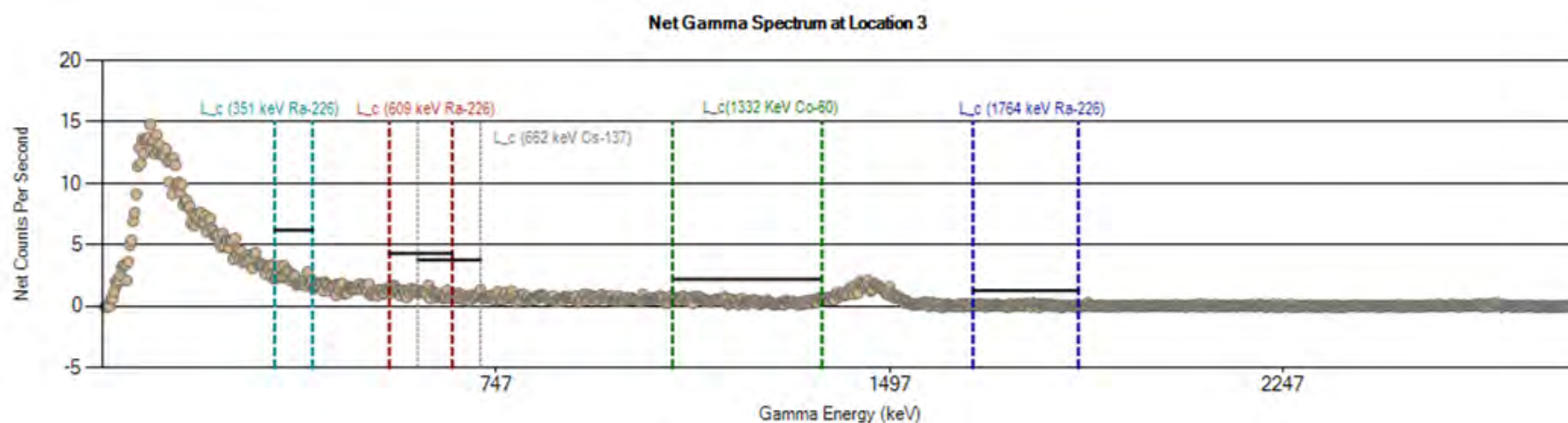




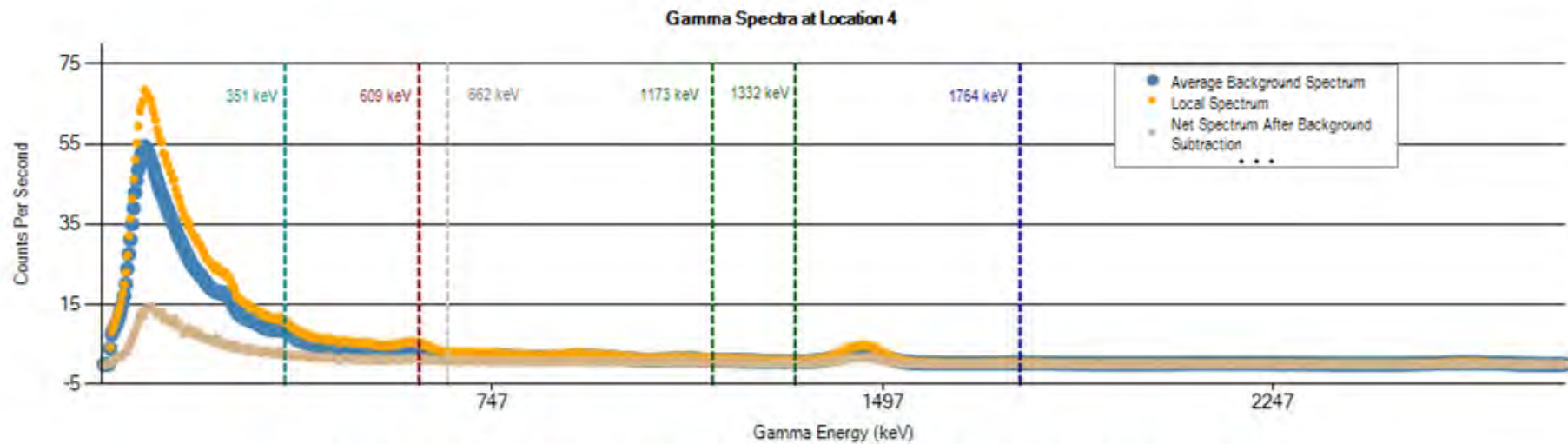
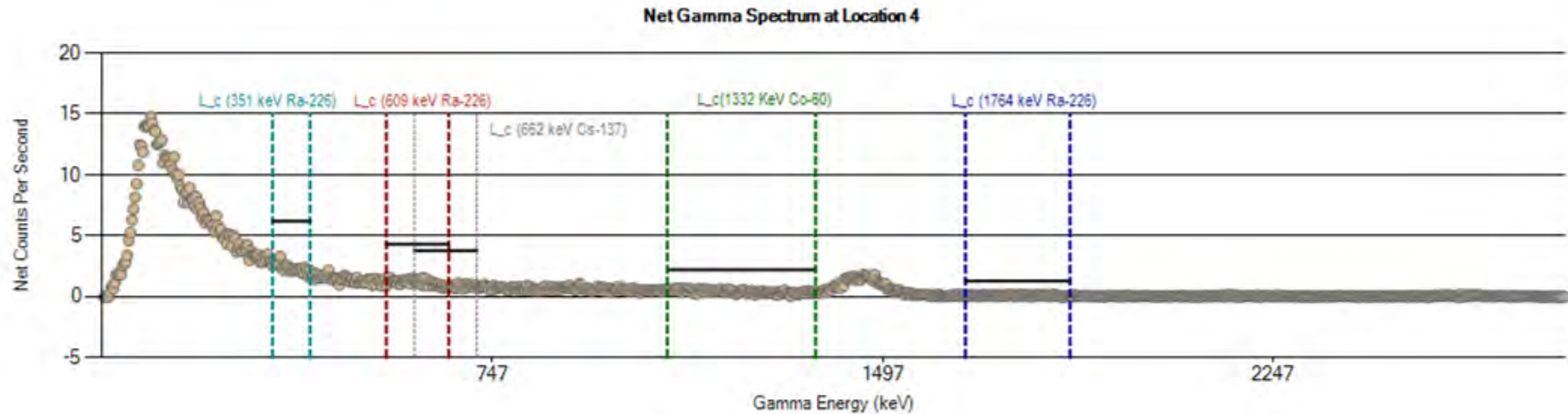
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Location 1 (cps)	1056	146	25	26	188	171	133	217	115	4353
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



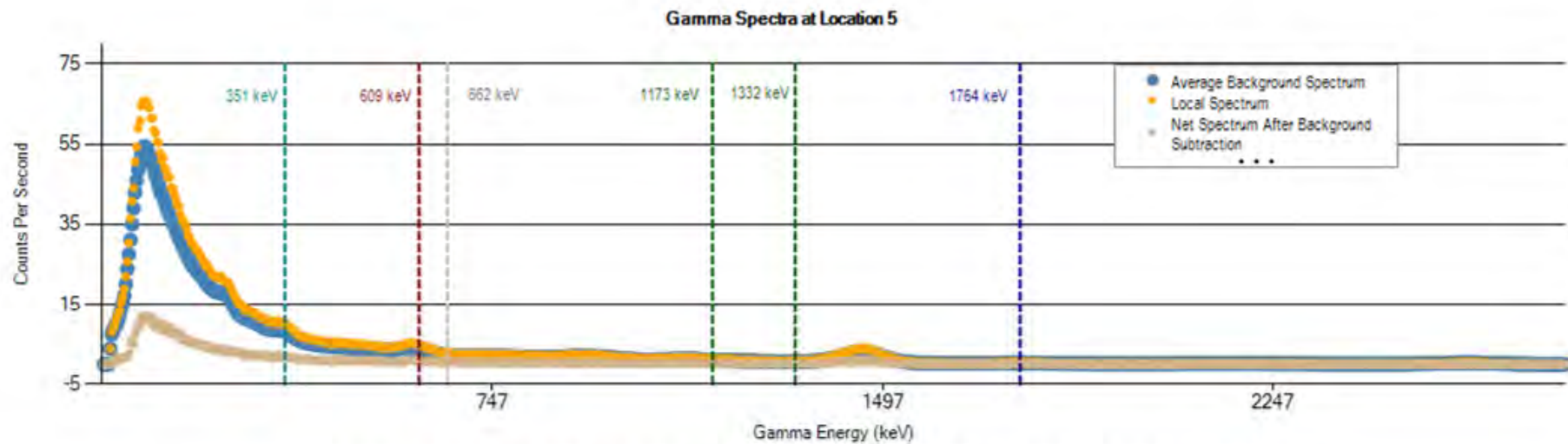
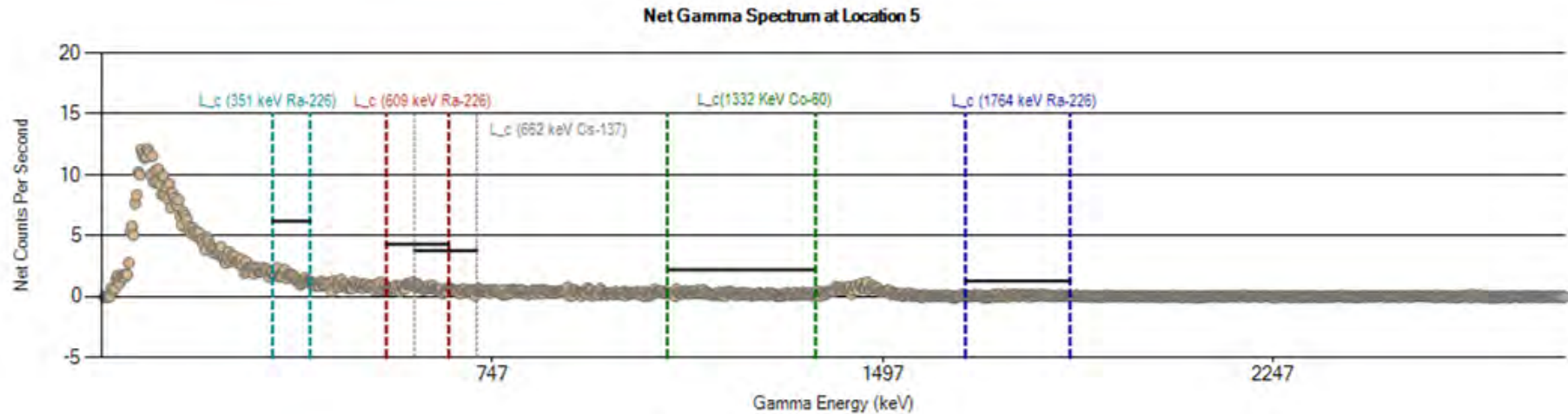
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Location 2 (cps)	1184	177	27	31	203	188	148	233	130	4737
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



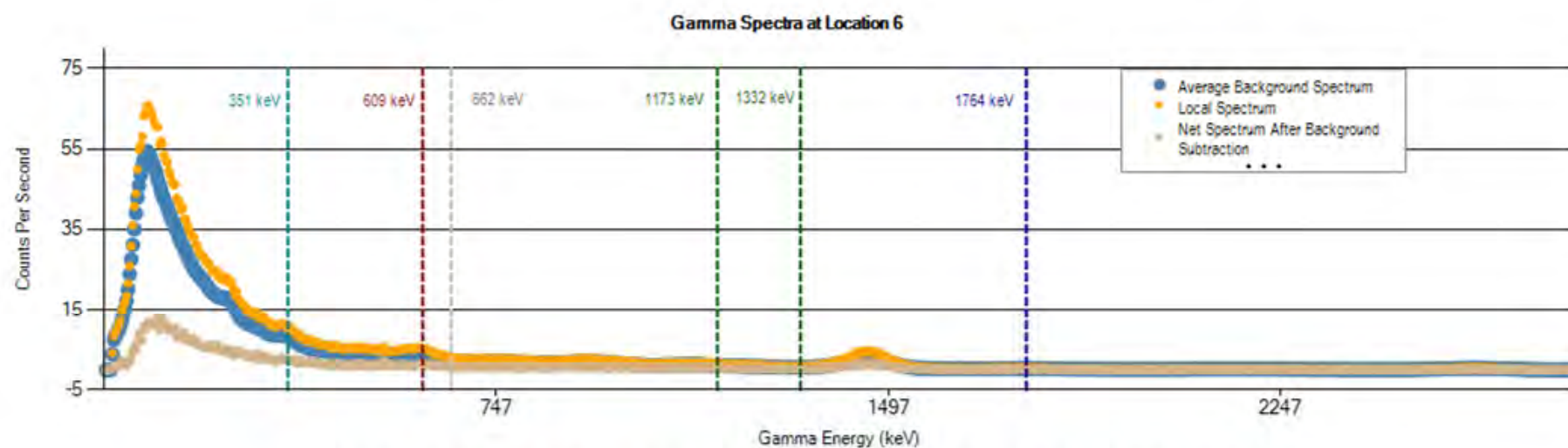
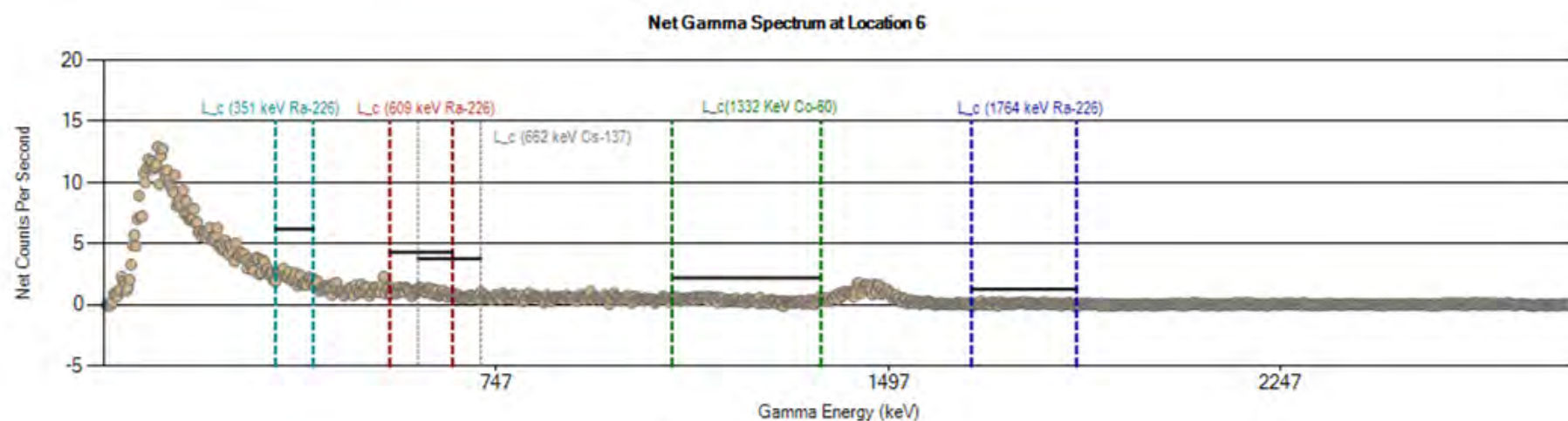
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Location 3 (cps)	1183	179	26	29	204	186	144	232	129	4720
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



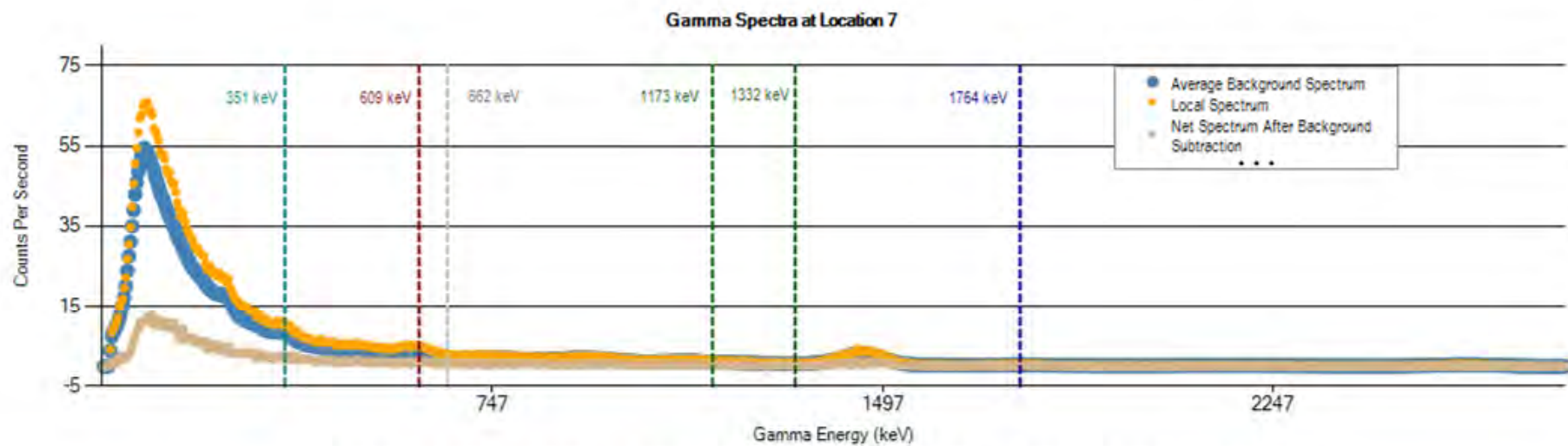
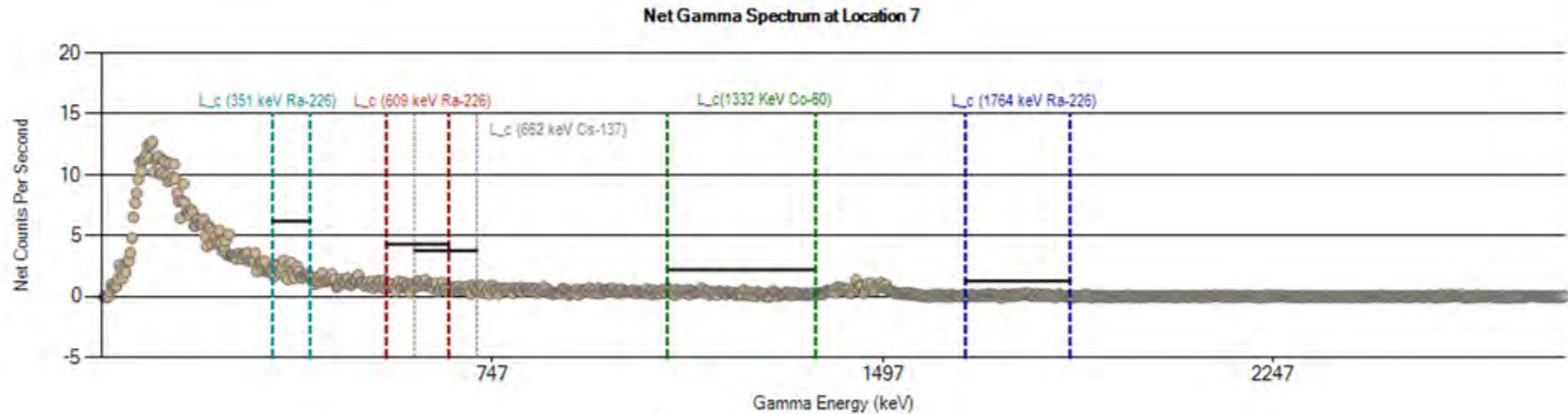
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 4 (cps)	1178	173	27	29	202	188	147	232	128	4707
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



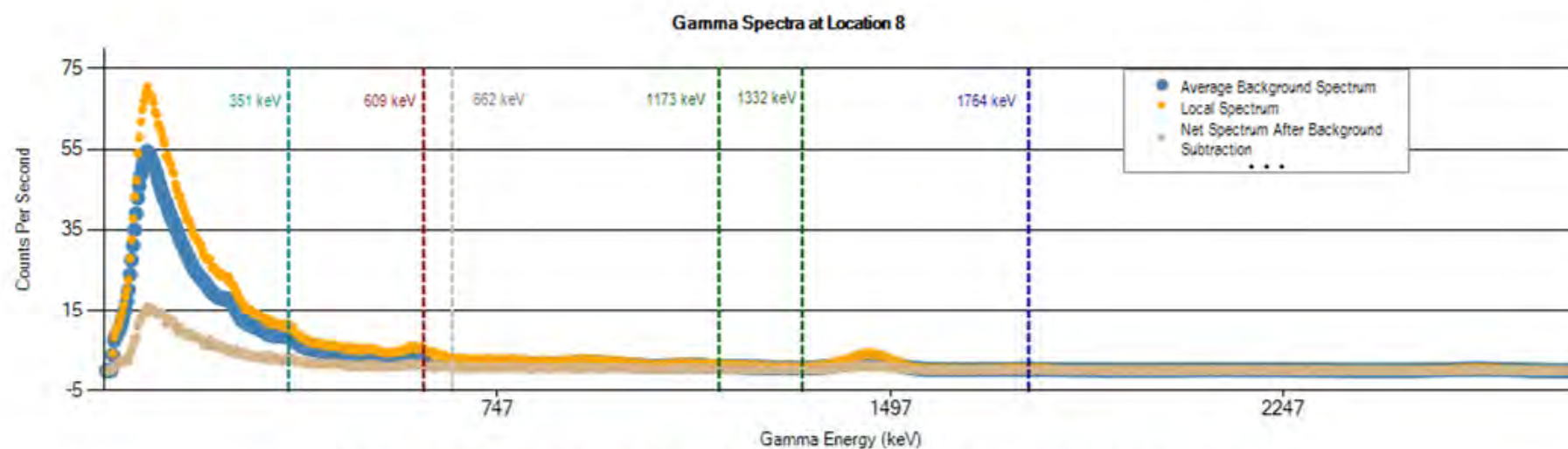
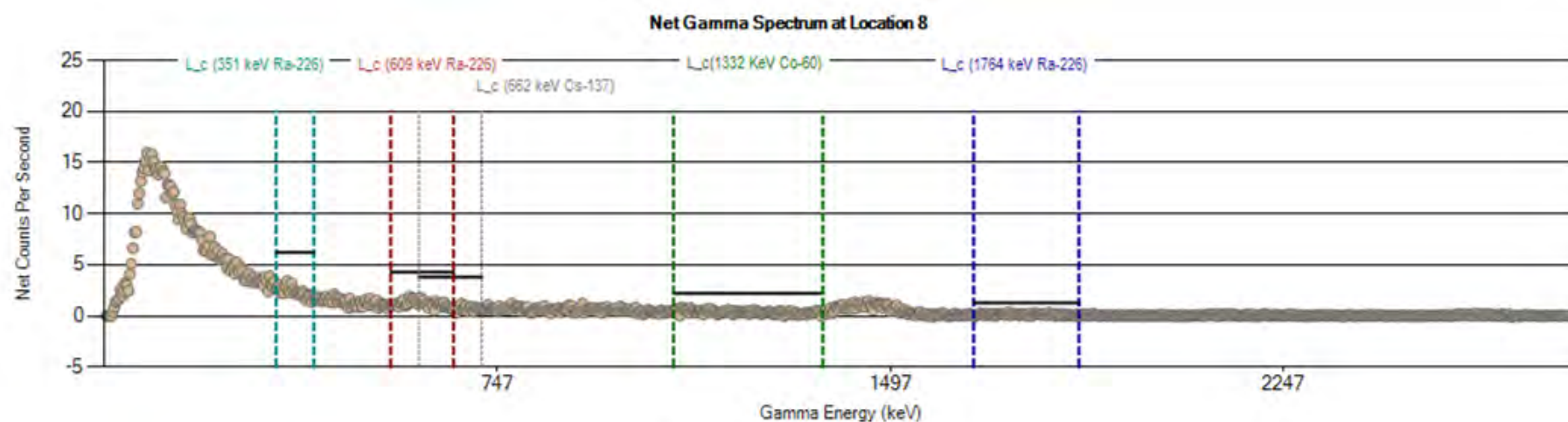
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Location 5 (cps)	1044	145	26	26	184	170	131	214	112	4370
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



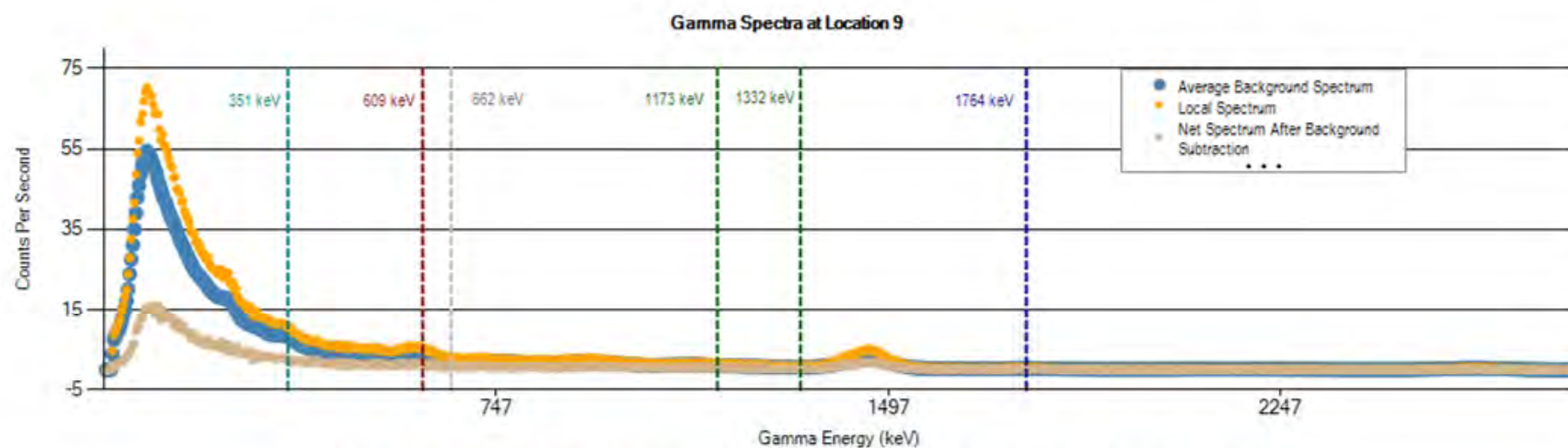
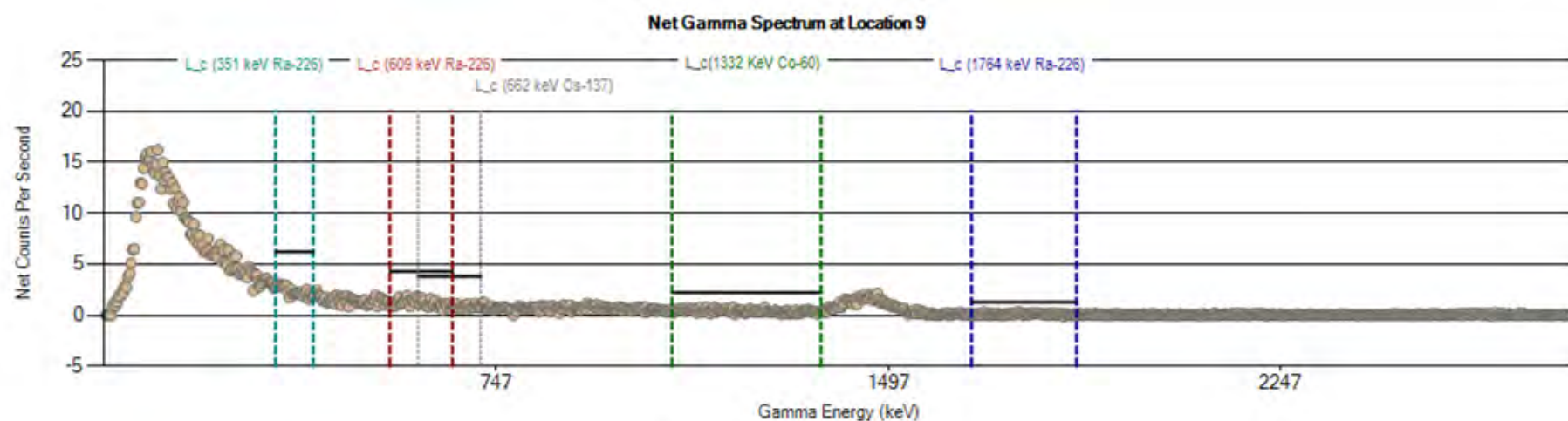
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 6 (cps)	1146	168	27	29	199	185	143	230	124	4577
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



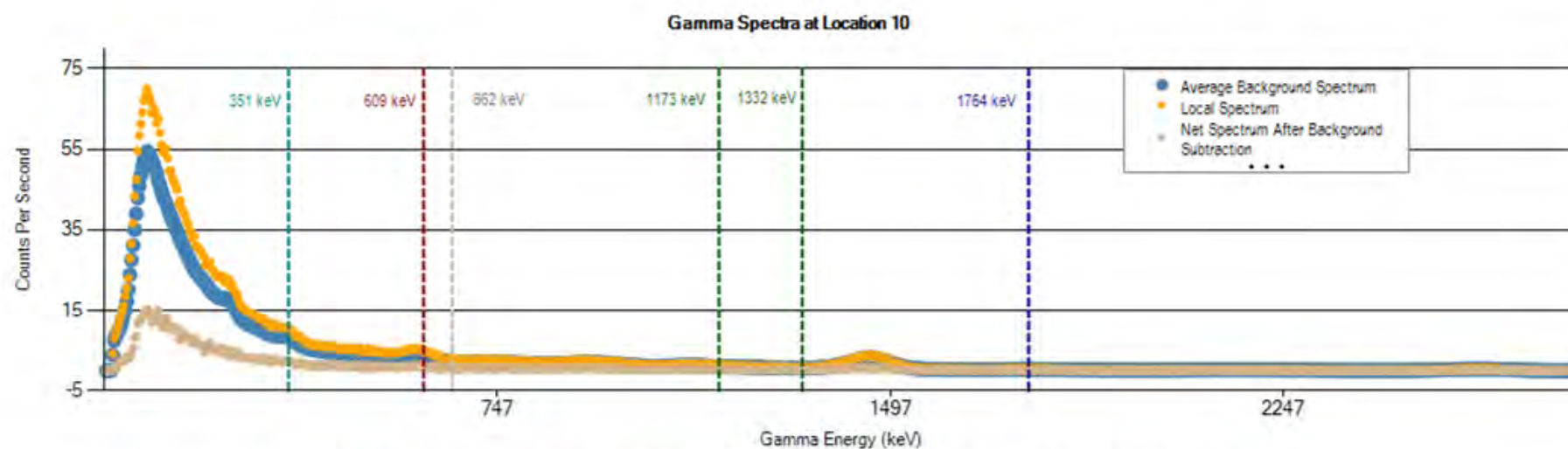
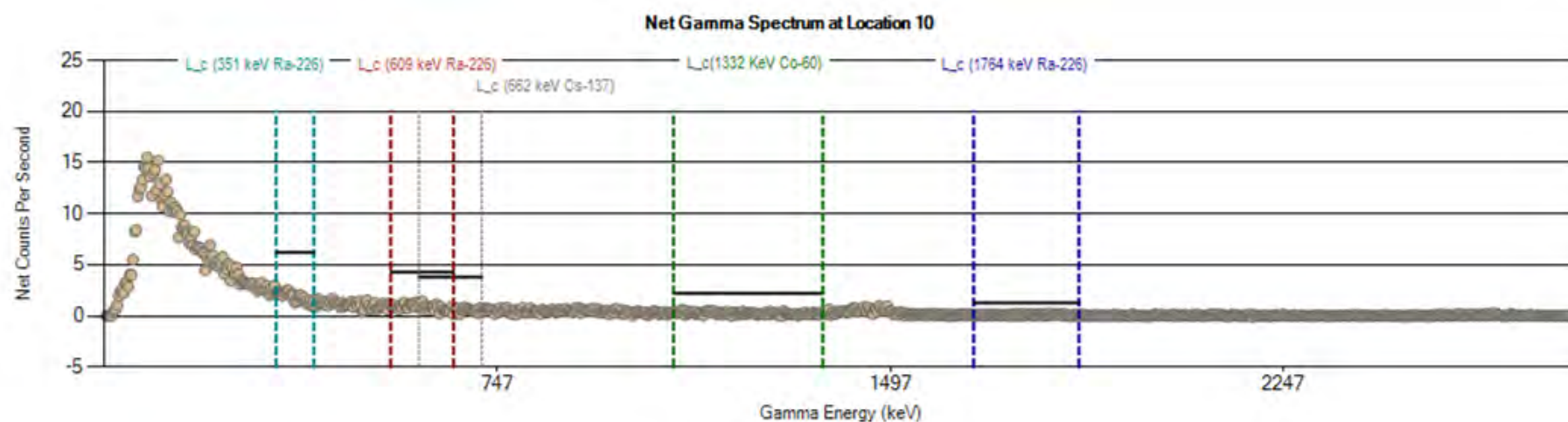
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 7 (cps)	1092	149	27	27	193	177	139	226	116	4507
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



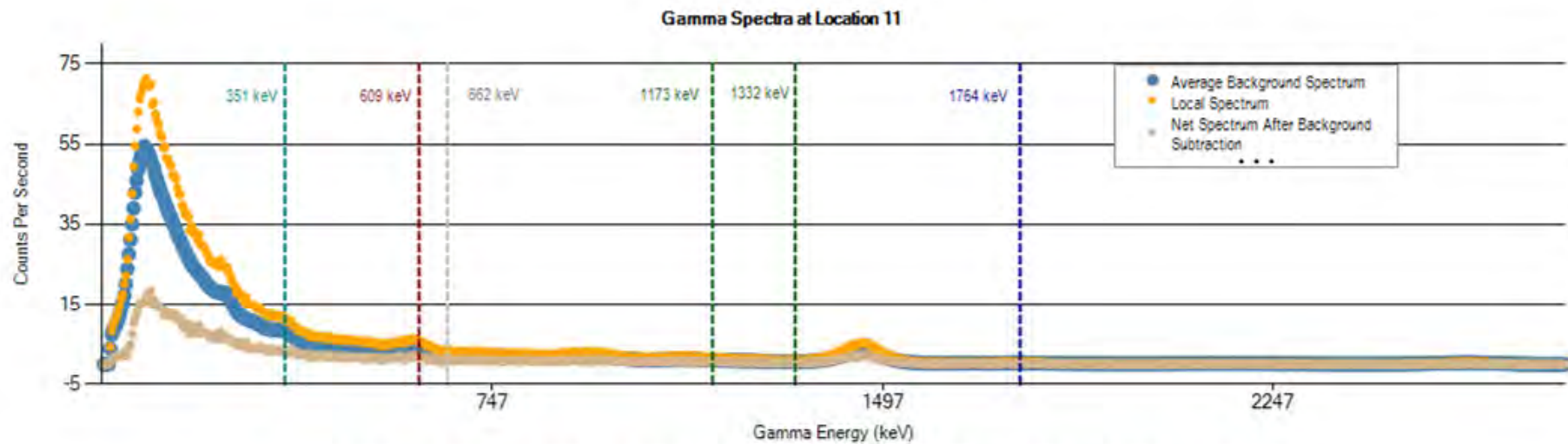
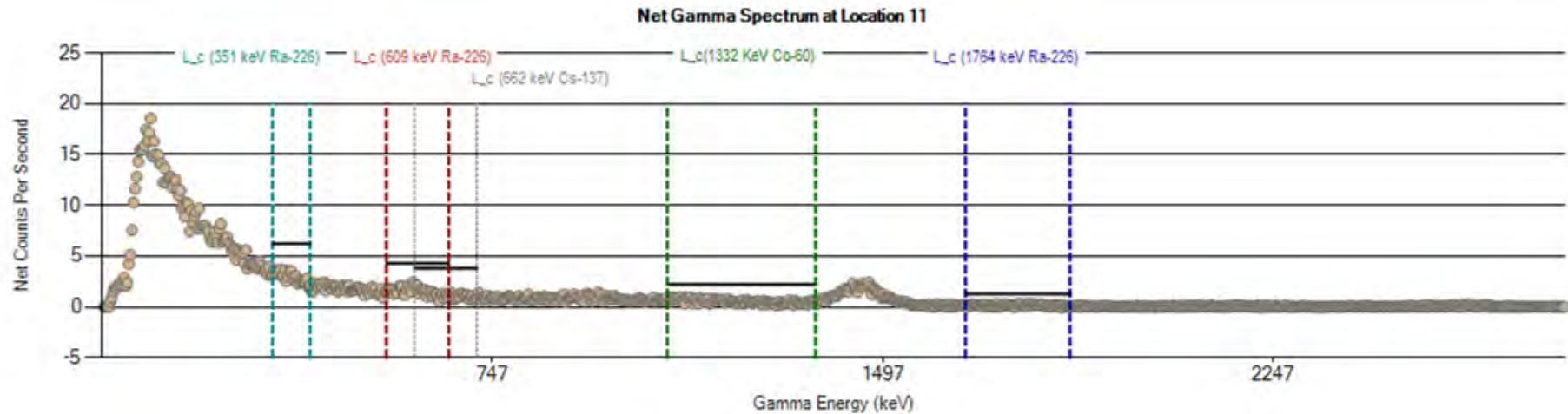
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 8 (cps)	1157	163	29	30	197	188	145	232	124	4738
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



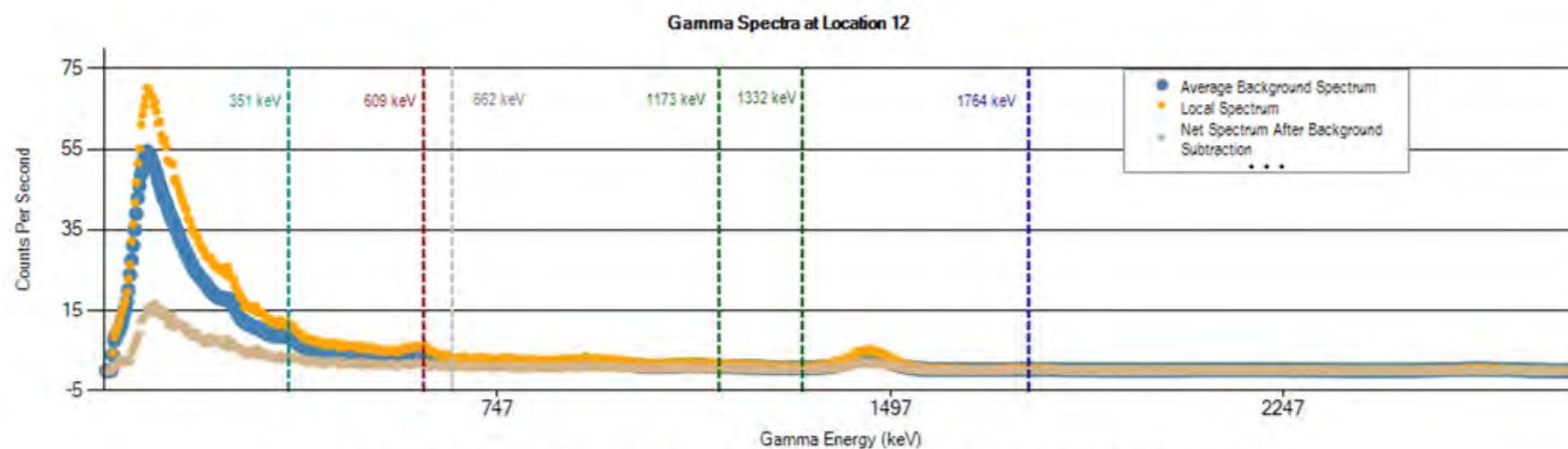
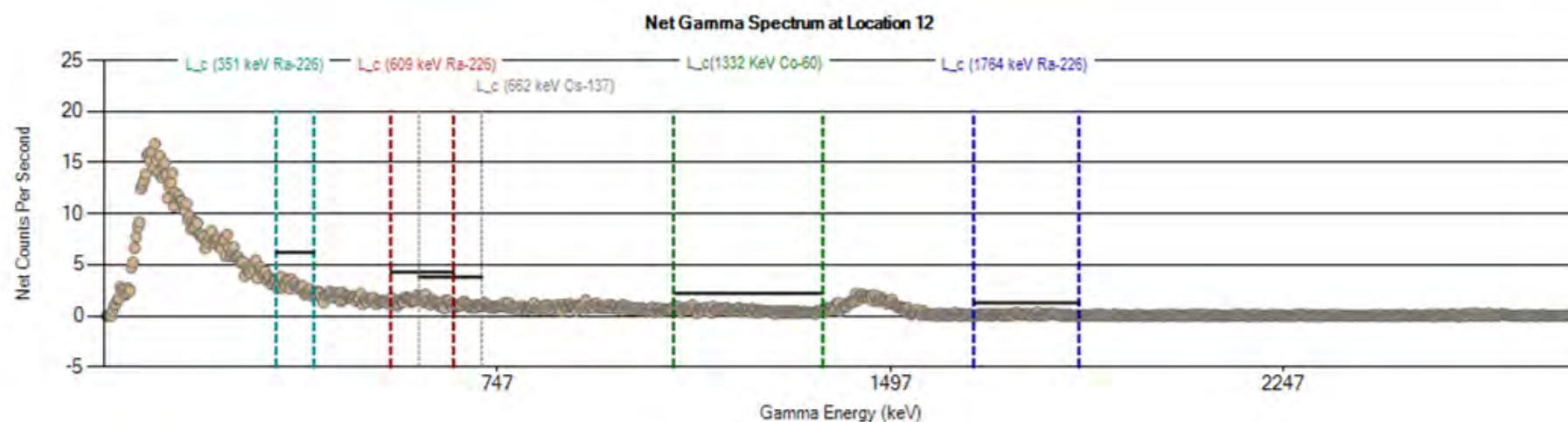
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 9 (cps)	1187	180	27	30	203	189	147	232	128	4776
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



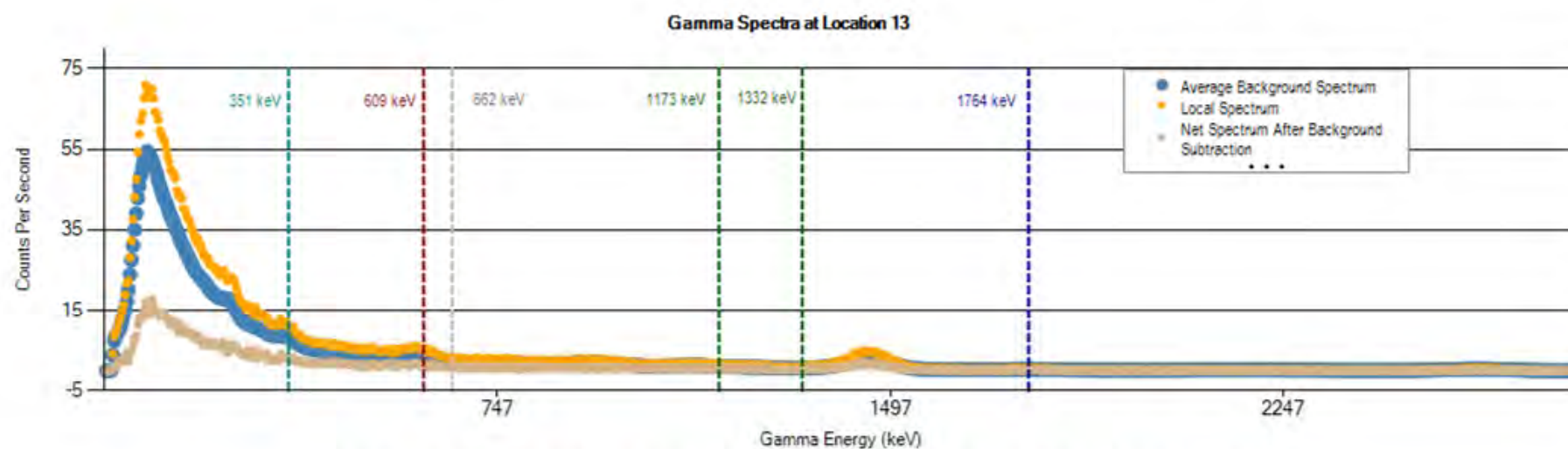
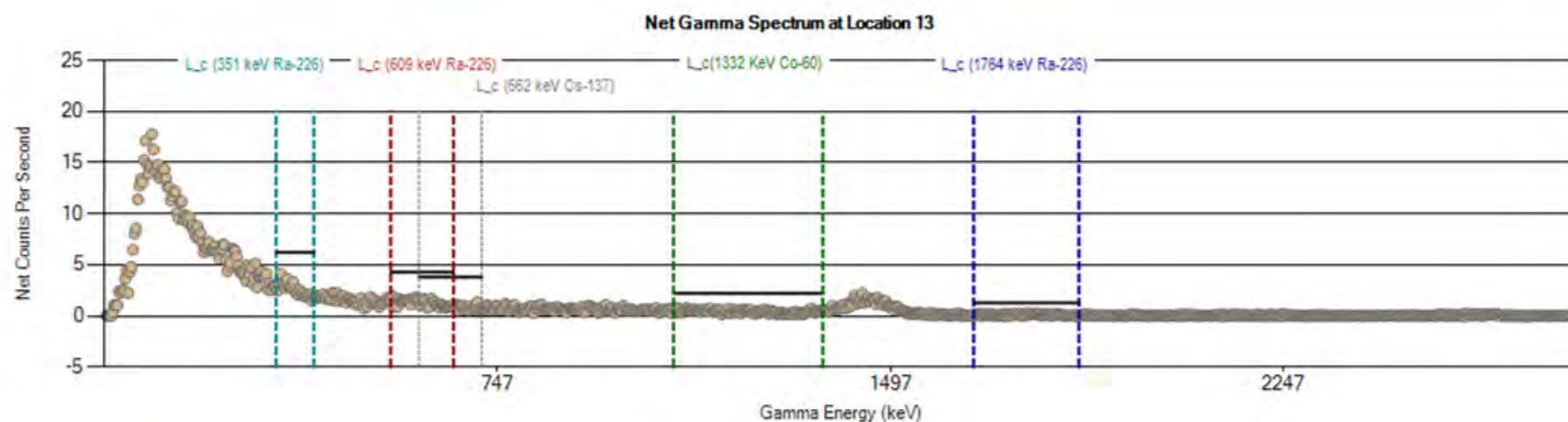
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 10 (cps)	1075	141	27	30	191	175	134	219	113	4563
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



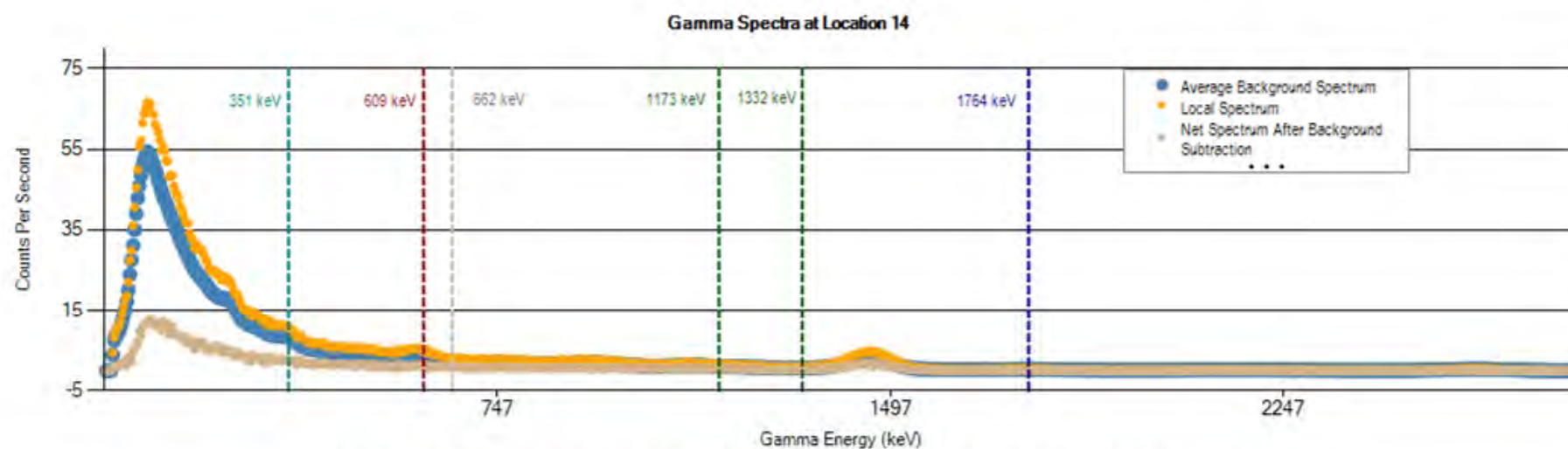
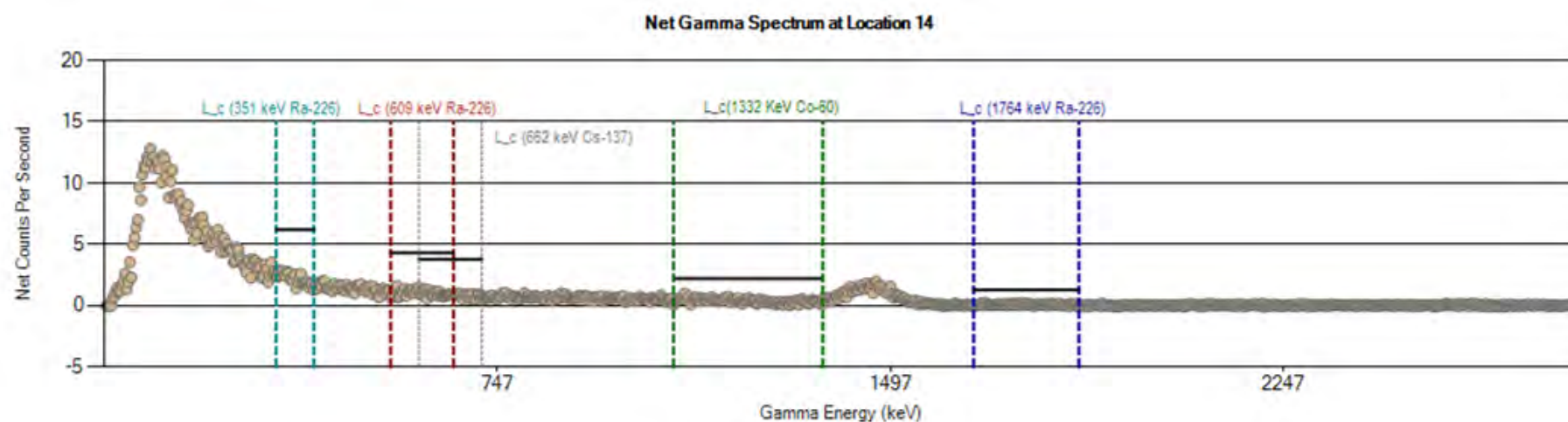
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 11 (cps)	1266	190	30	30	216	202	156	246	139	4938
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



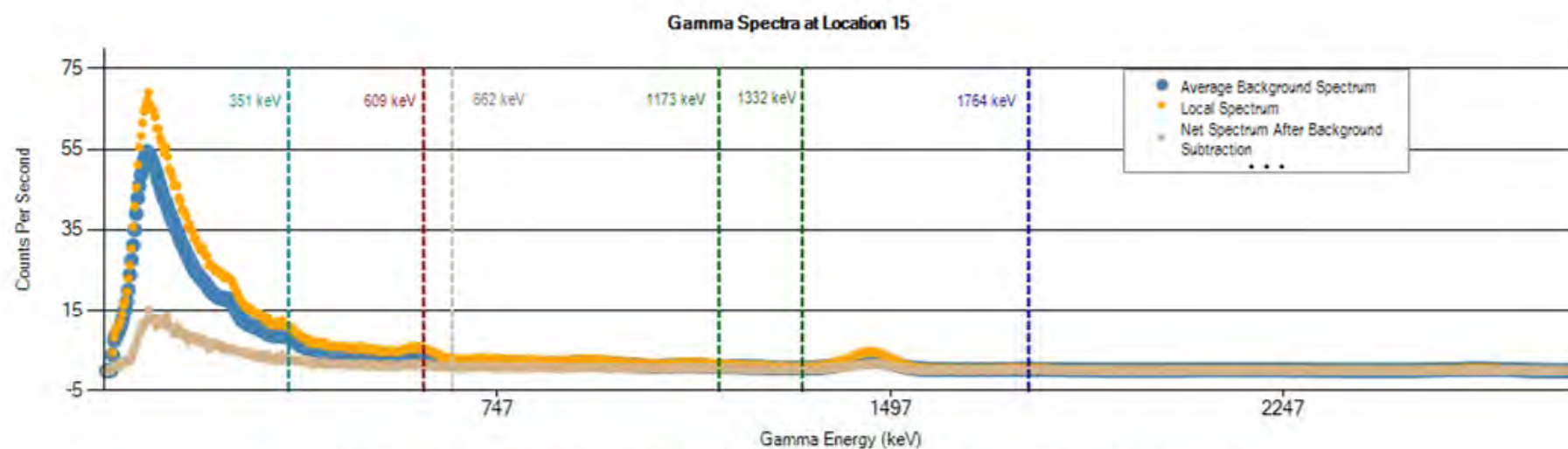
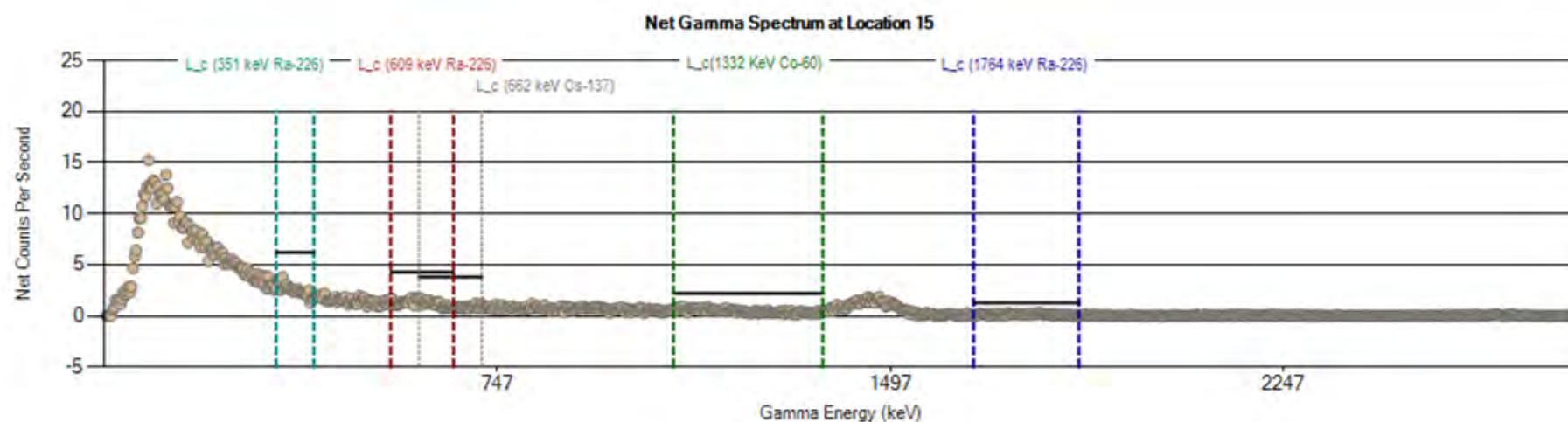
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 12 (cps)	1255	187	29	31	212	198	156	245	138	4901
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



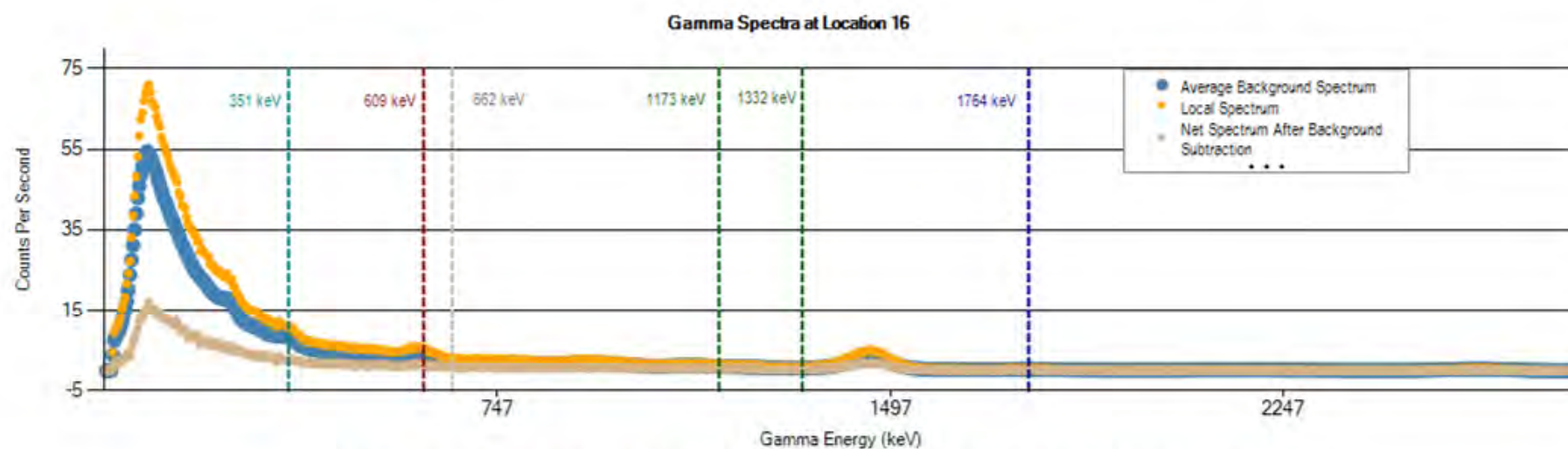
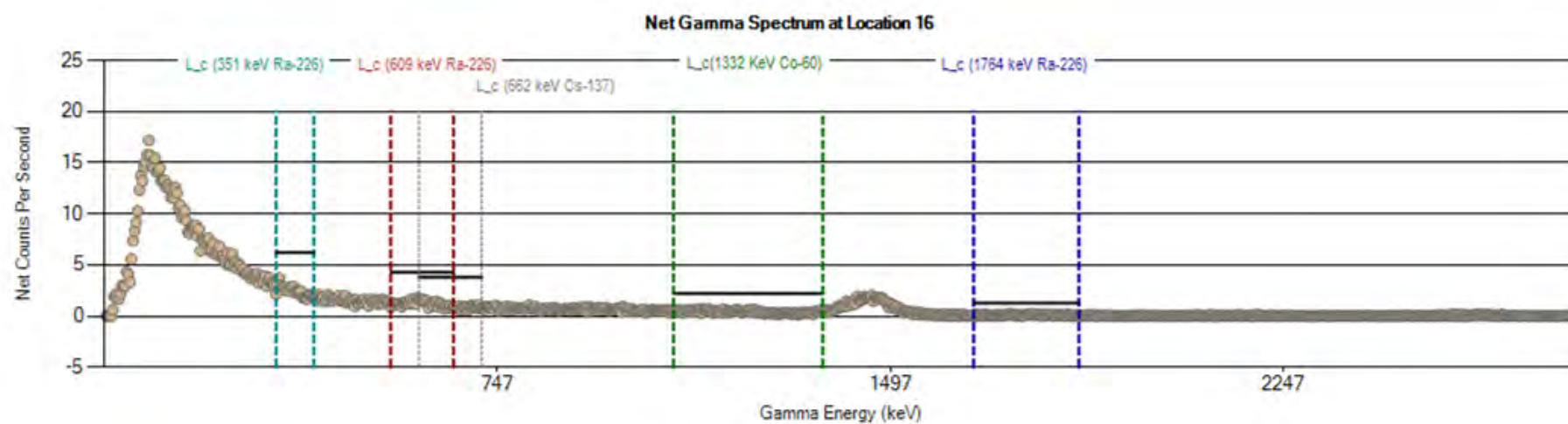
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 13 (cps)	1195	174	28	30	206	193	147	238	131	4807
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



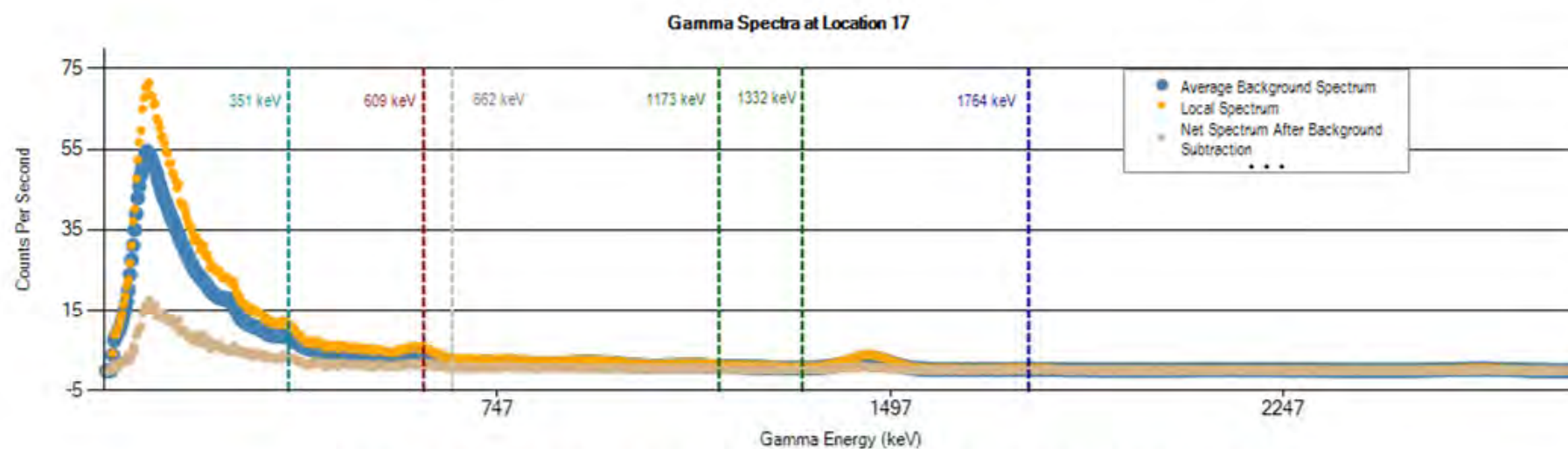
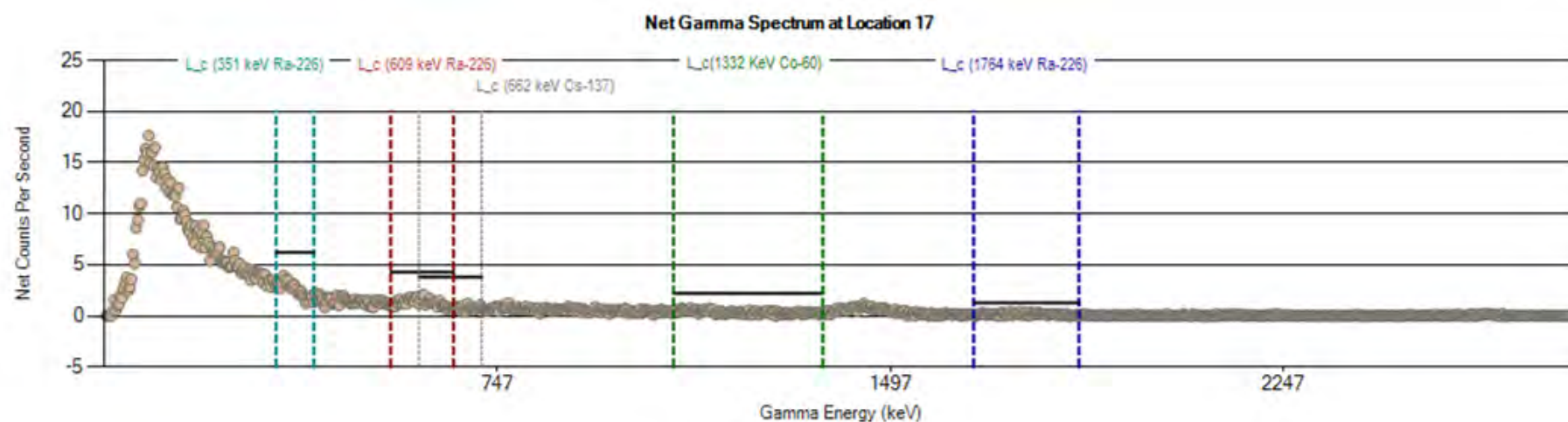
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 14 (cps)	1166	176	26	28	200	183	143	228	127	4602
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



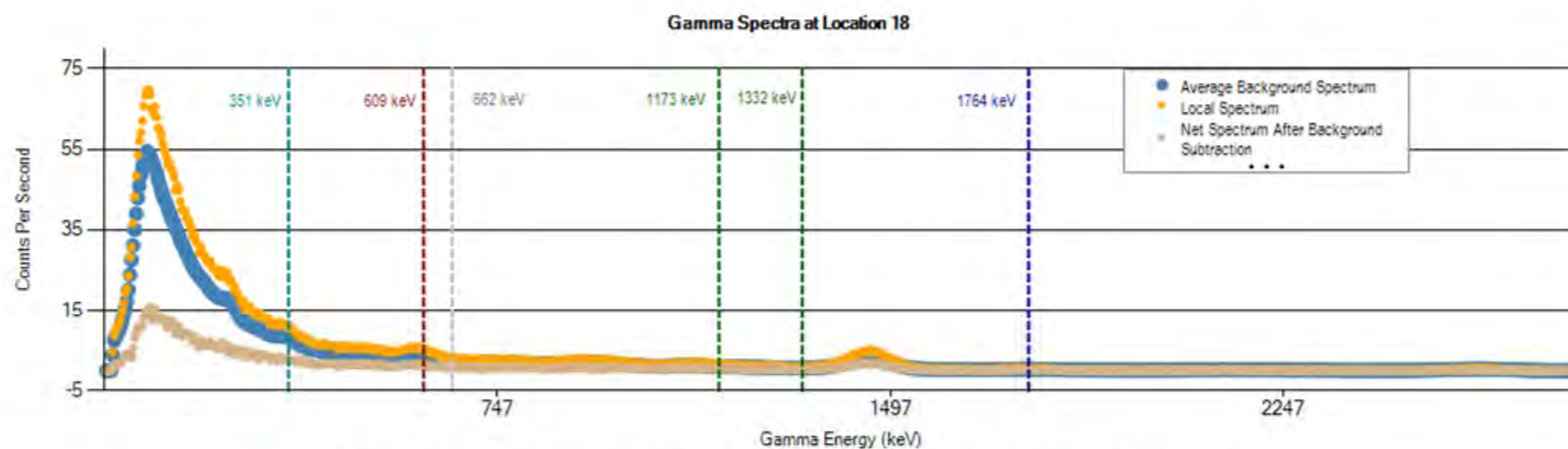
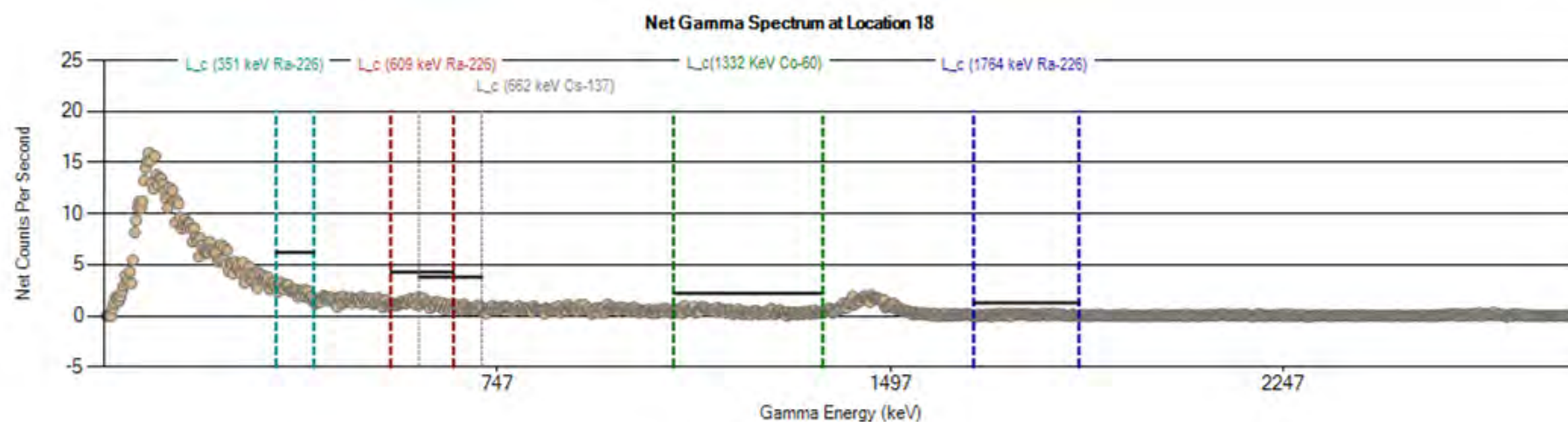
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 15 (cps)	1200	176	29	29	204	191	149	237	133	4720
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



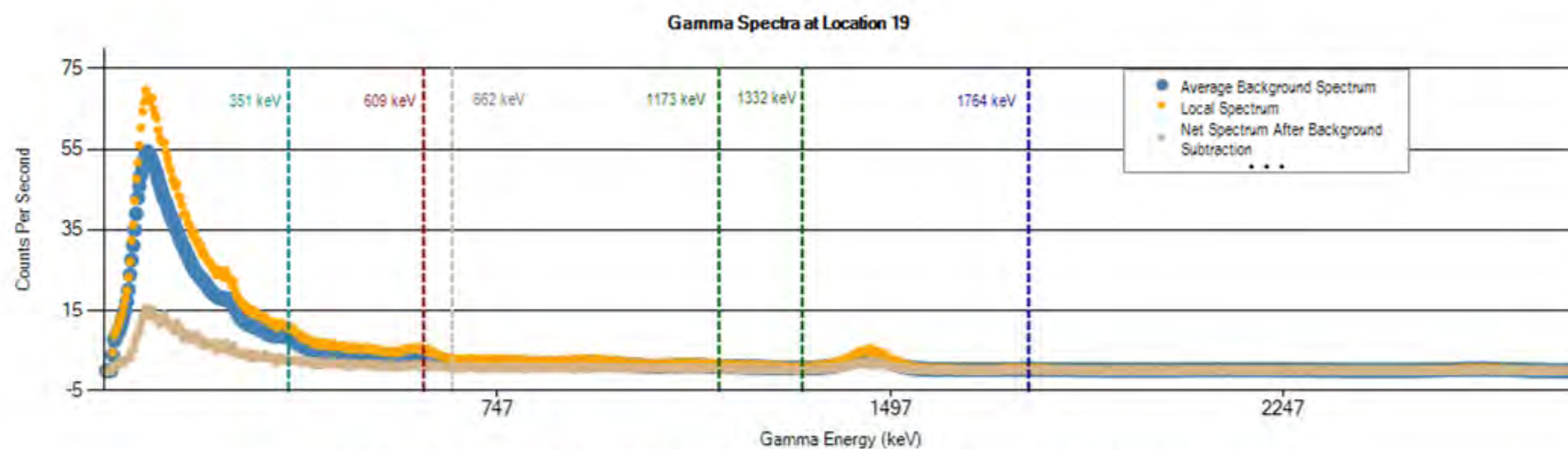
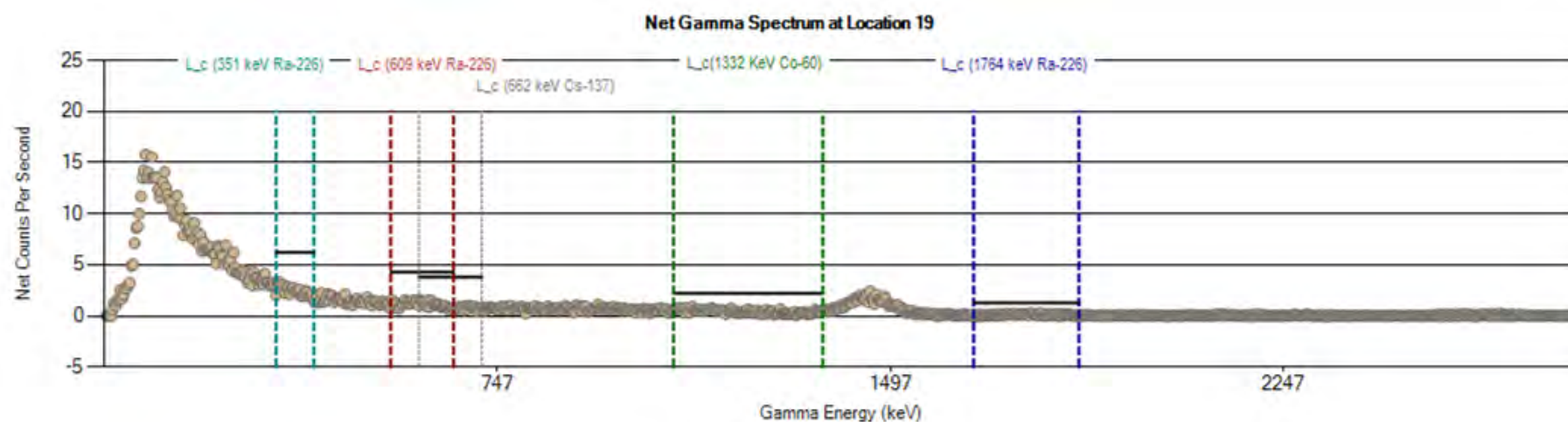
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 16 (cps)	1197	181	27	30	205	190	149	235	129	4800
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



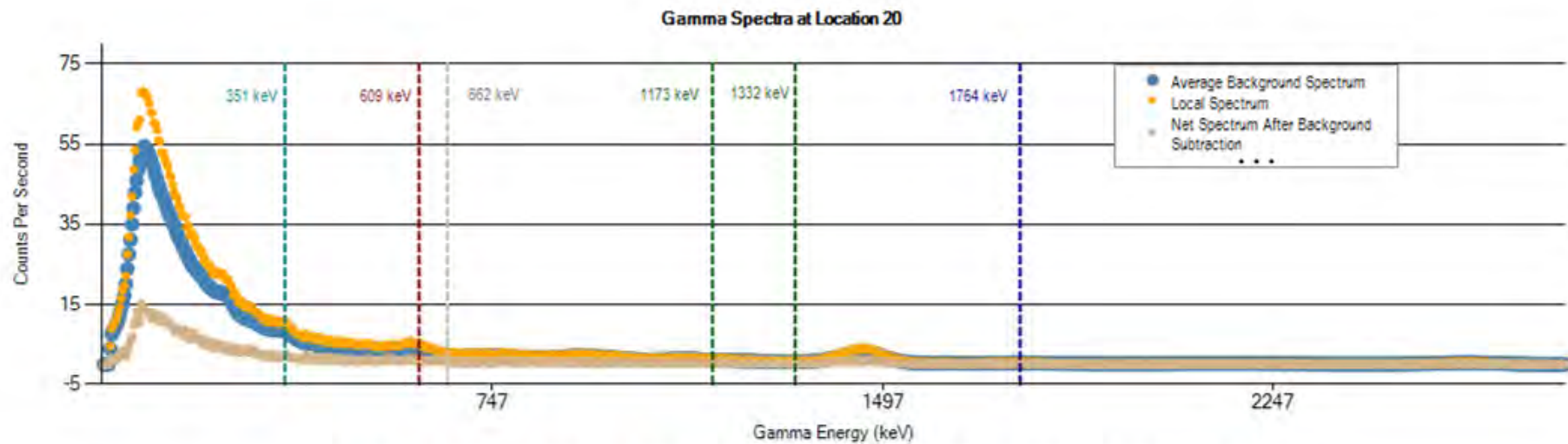
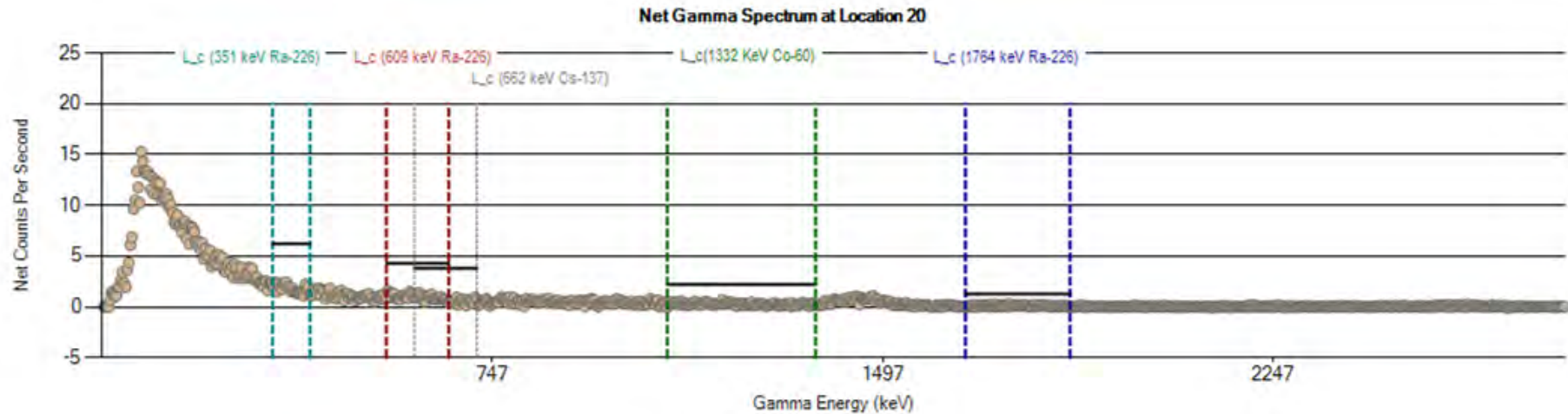
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 17 (cps)	1150	150	31	30	202	193	148	238	123	4747
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



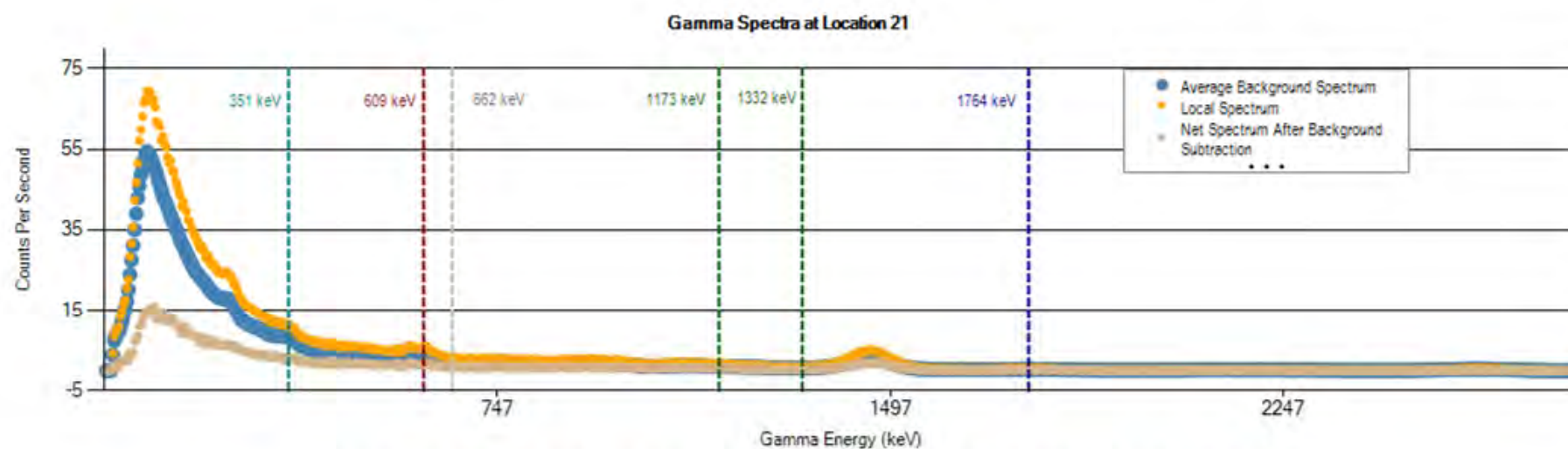
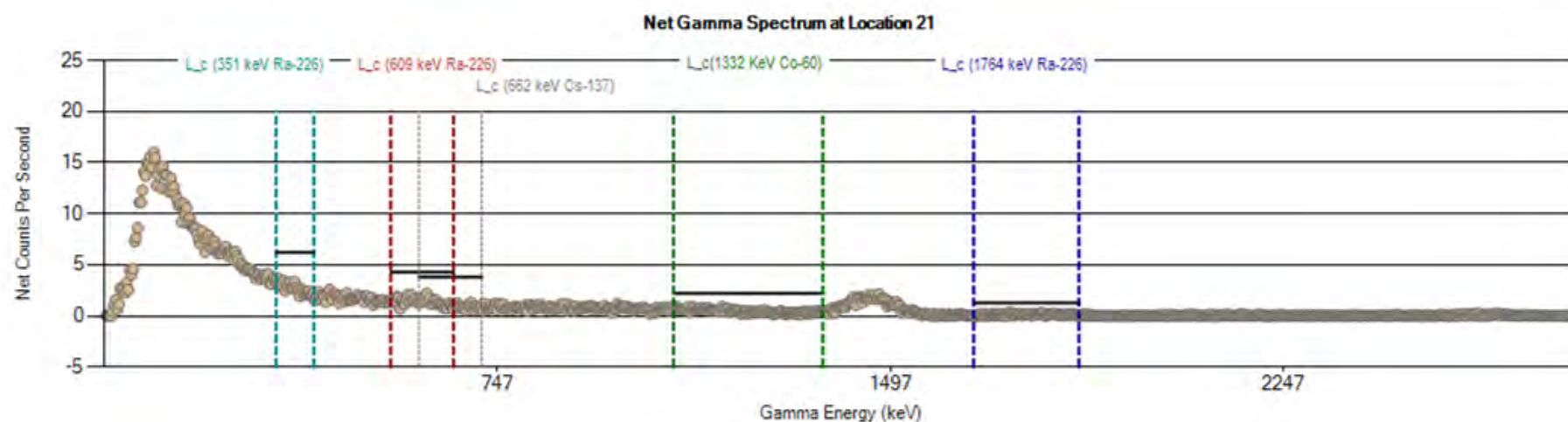
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 18 (cps)	1187	177	27	31	206	190	146	234	129	4743
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



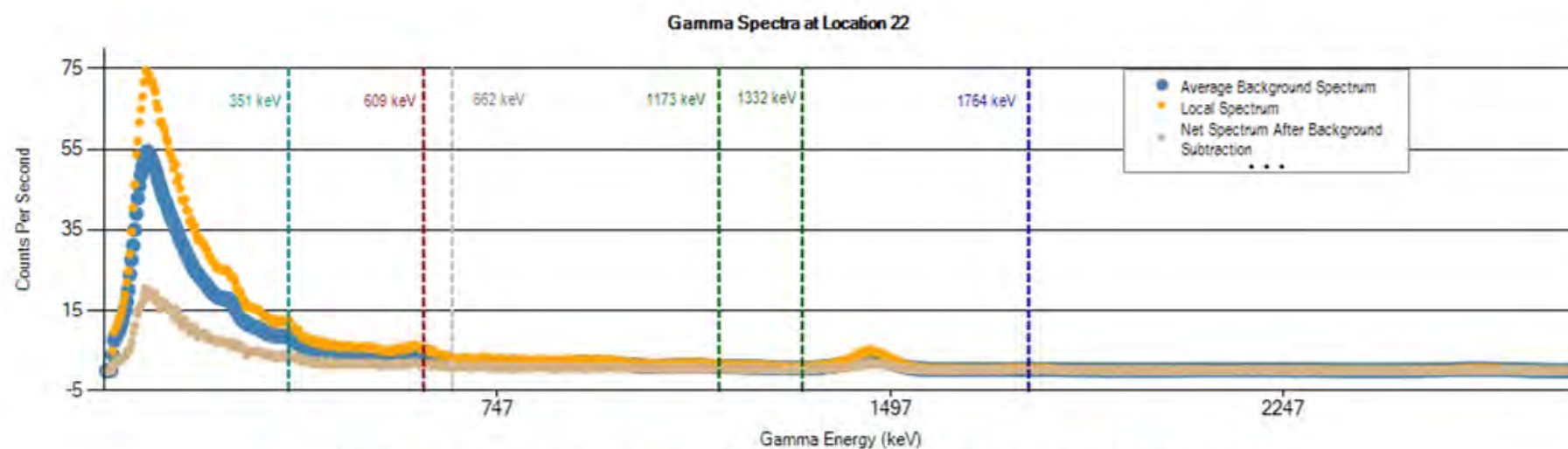
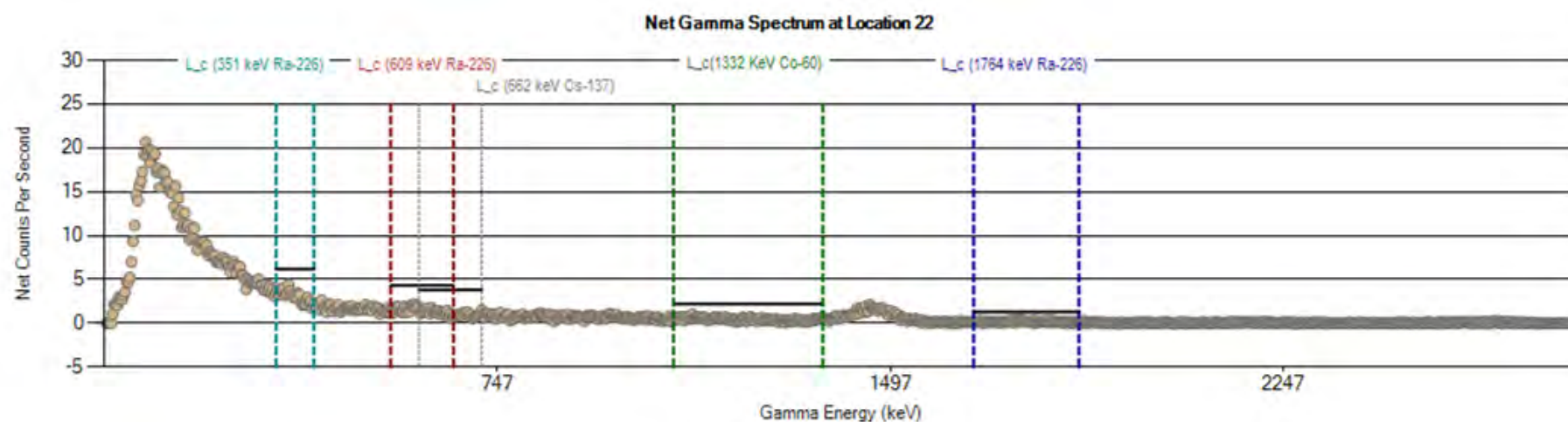
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 19 (cps)	1192	182	28	30	203	186	145	235	129	4738
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



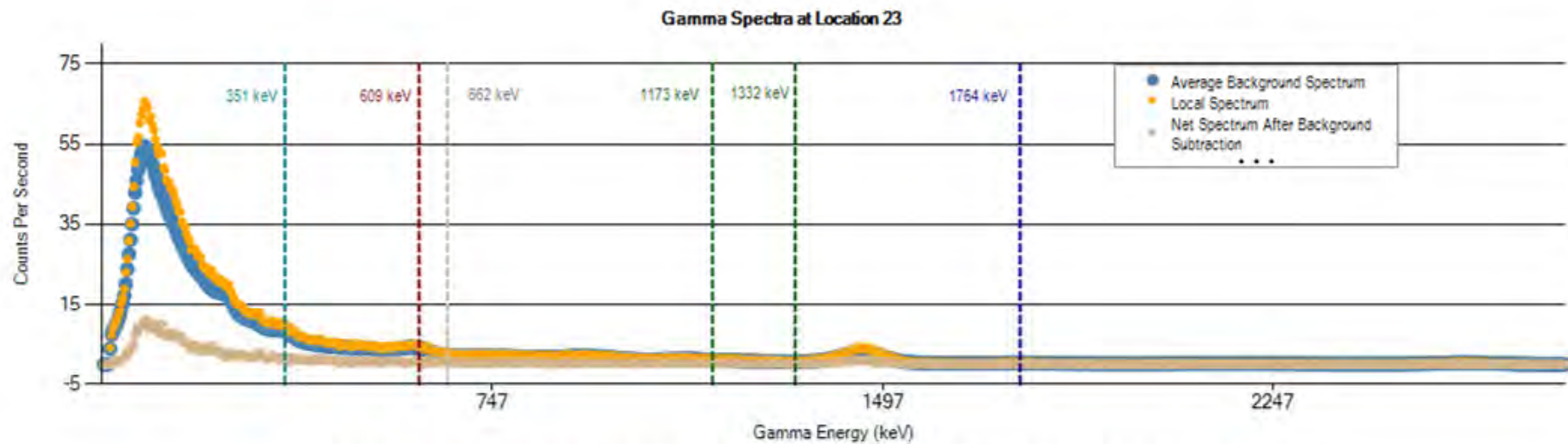
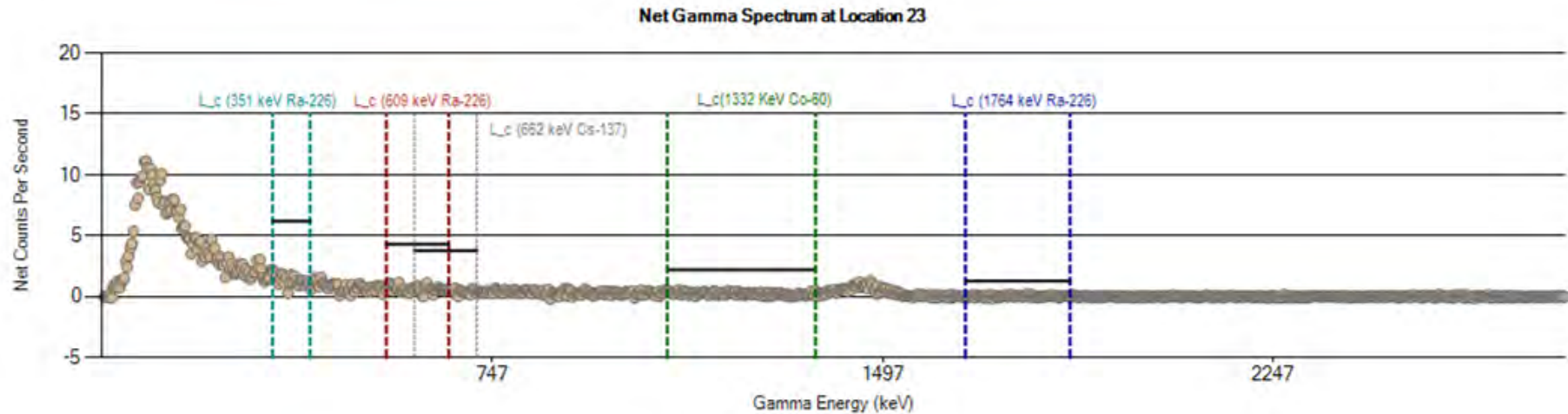
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 20 (cps)	1091	148	27	30	190	179	137	218	116	4539
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



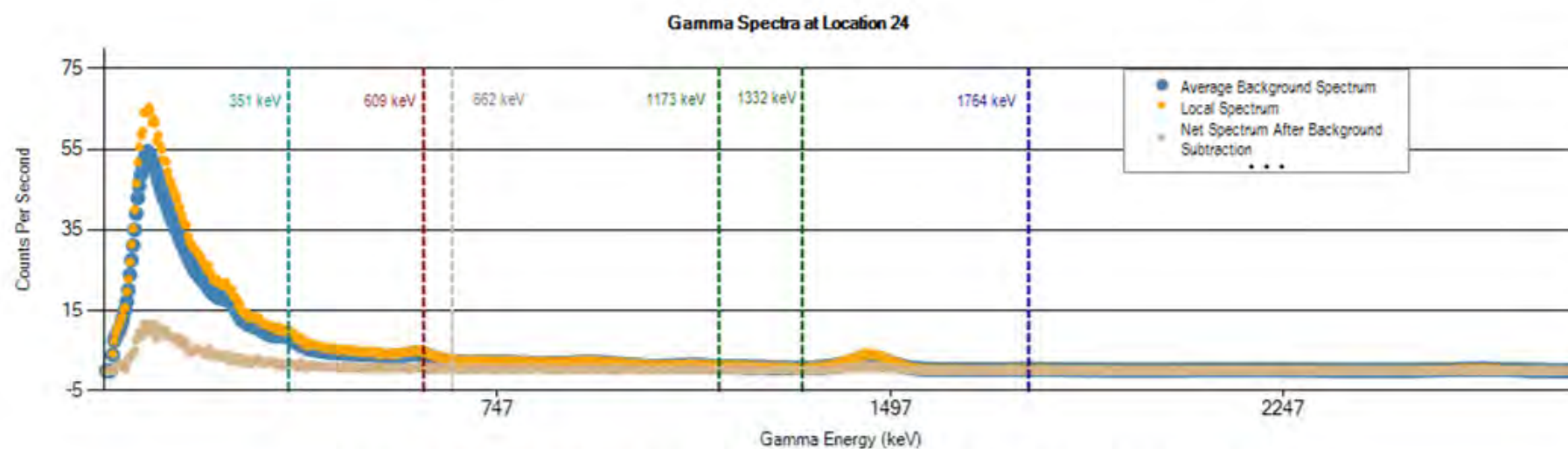
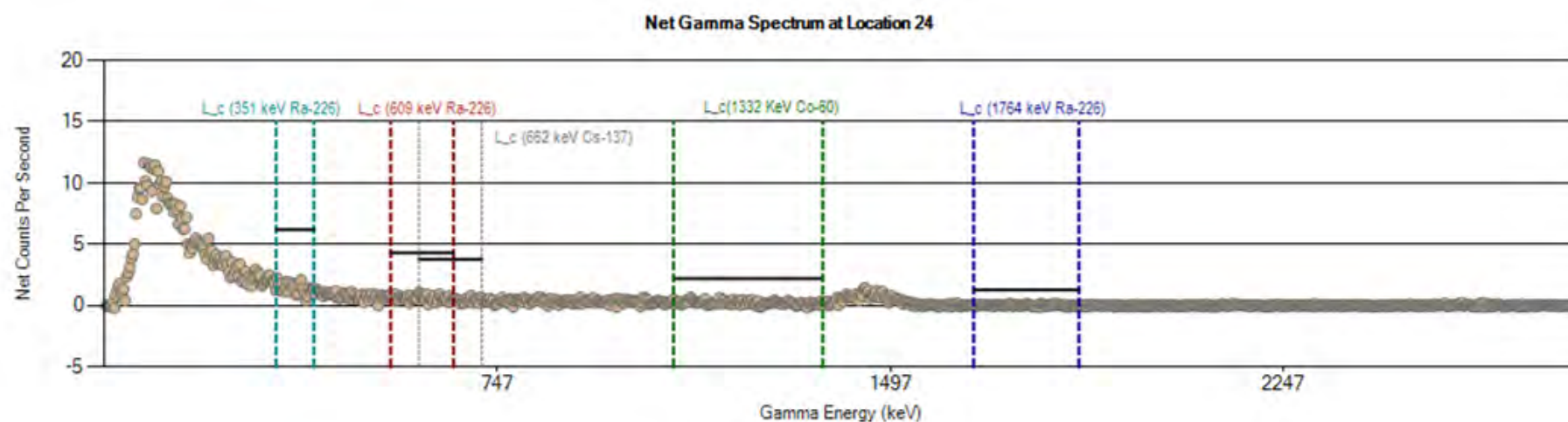
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 21 (cps)	1236	184	29	31	212	197	152	240	134	4851
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



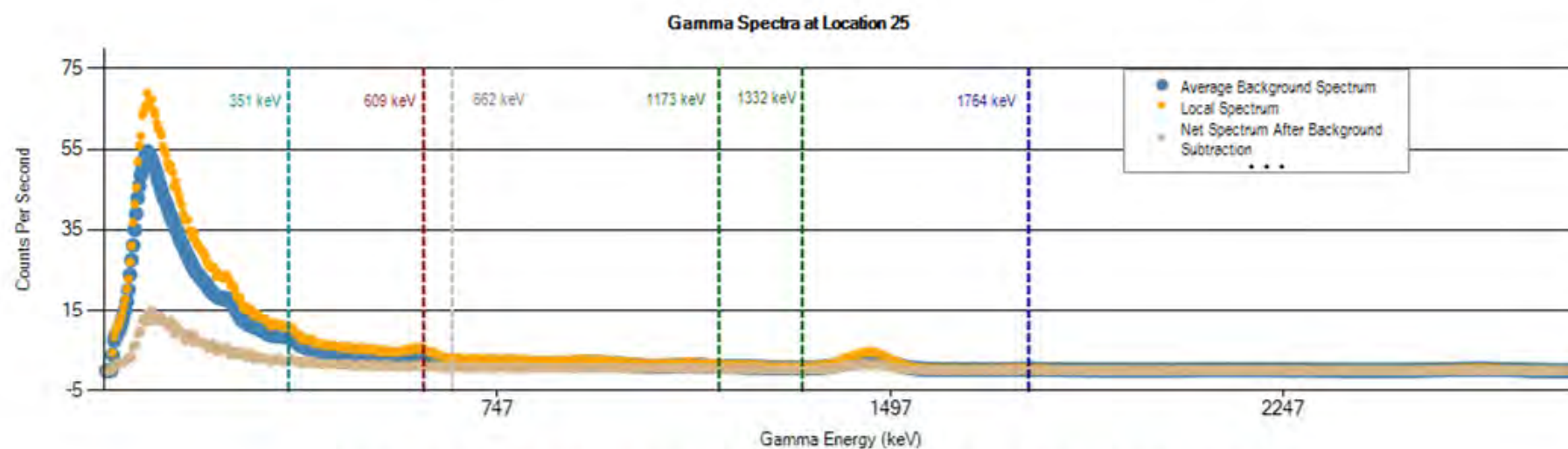
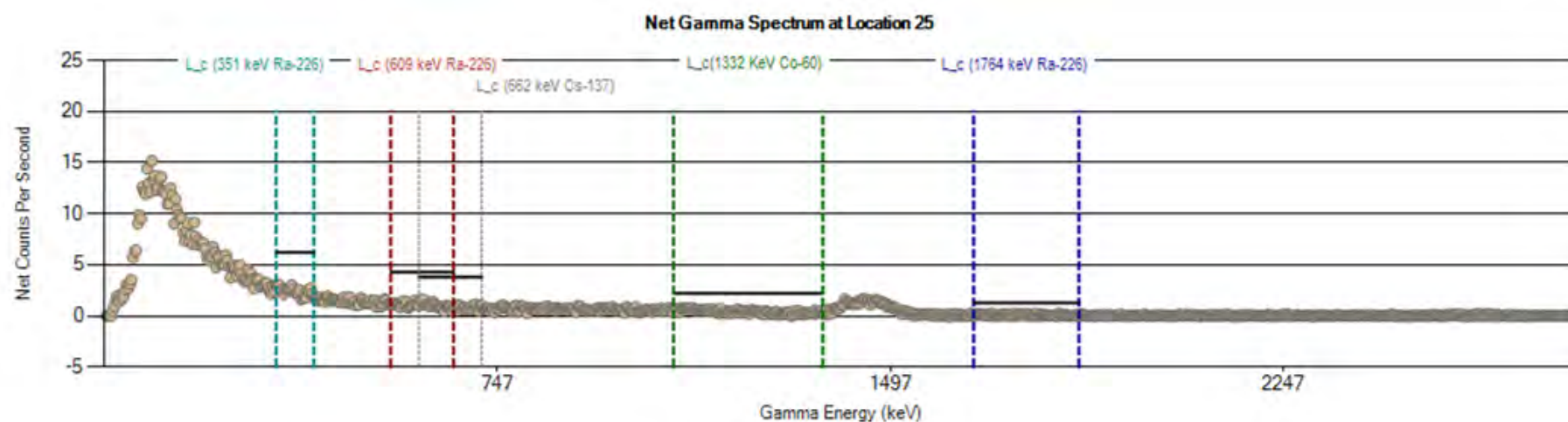
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 22 (cps)	1225	176	31	31	214	199	153	249	133	5020
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



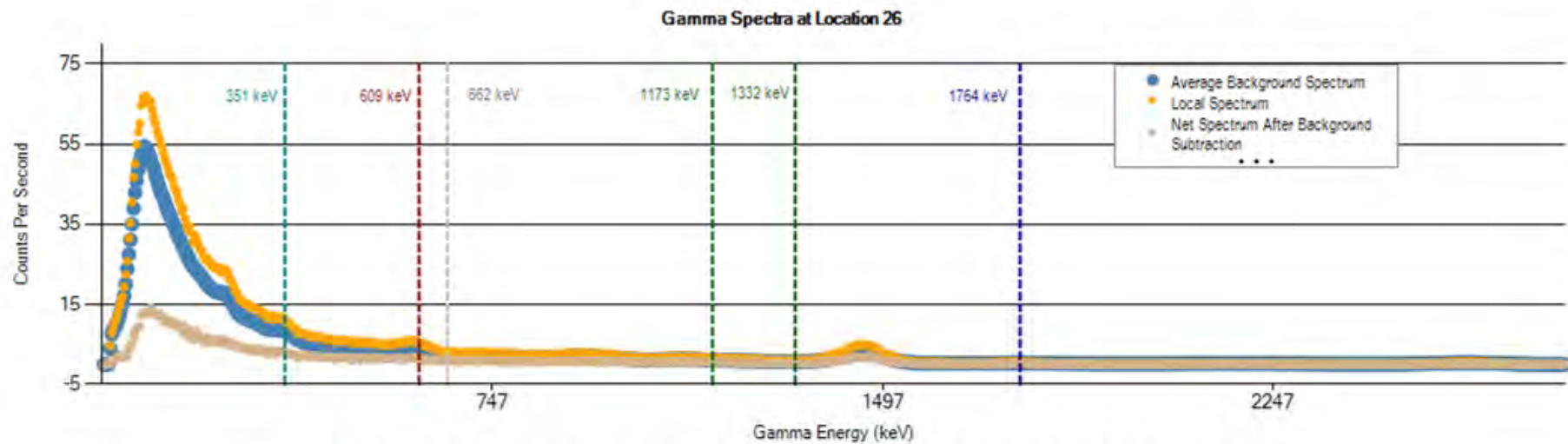
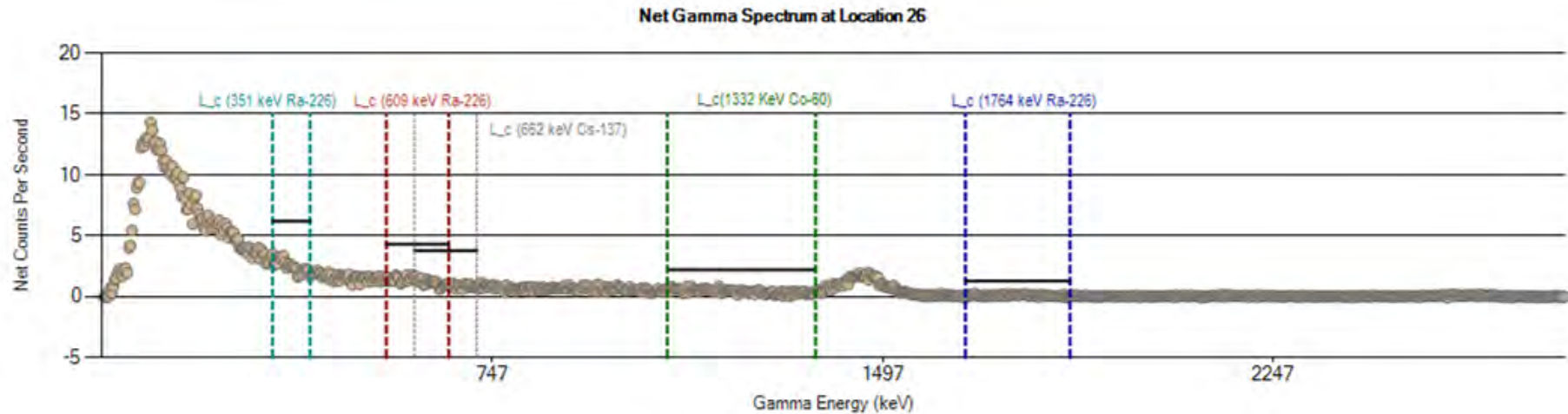
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 23 (cps)	1023	147	23	25	178	165	127	207	112	4281
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



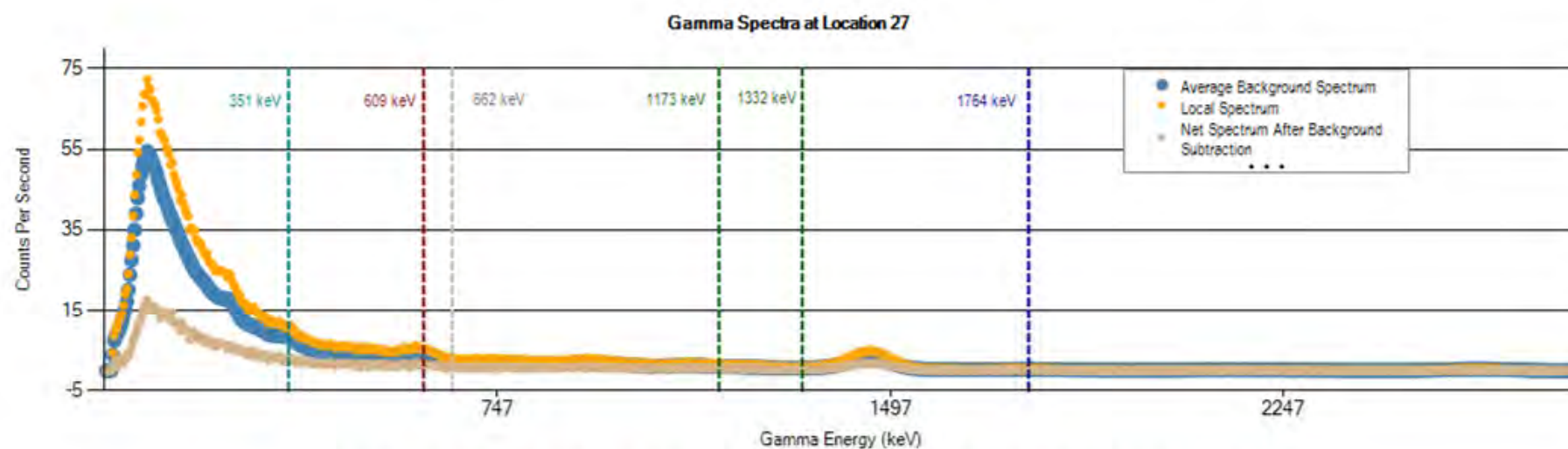
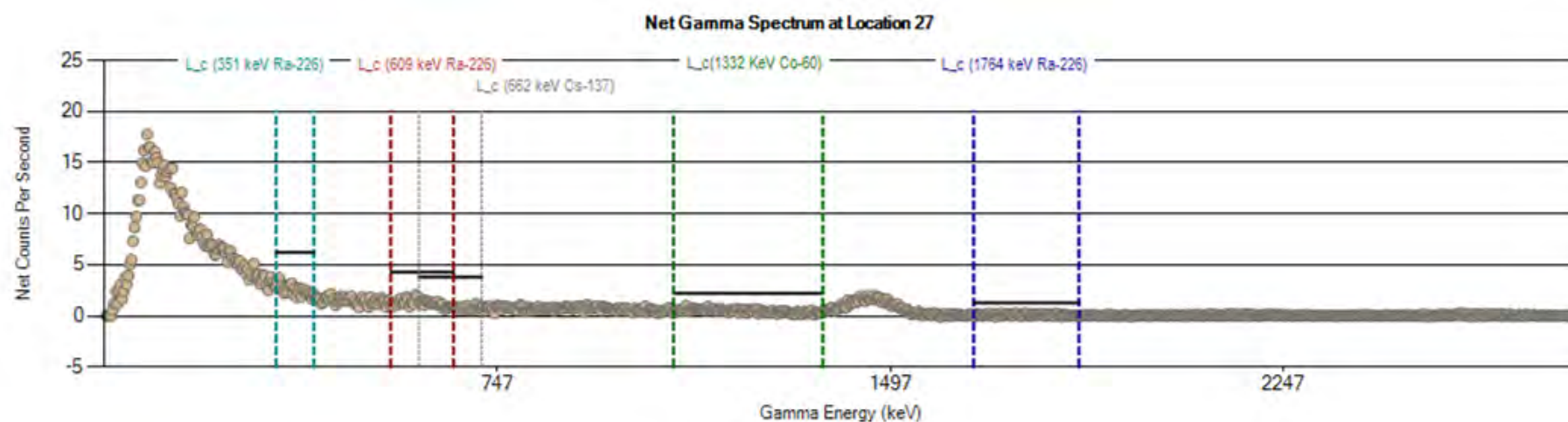
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 24 (cps)	1028	149	23	27	178	165	128	209	111	4333
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



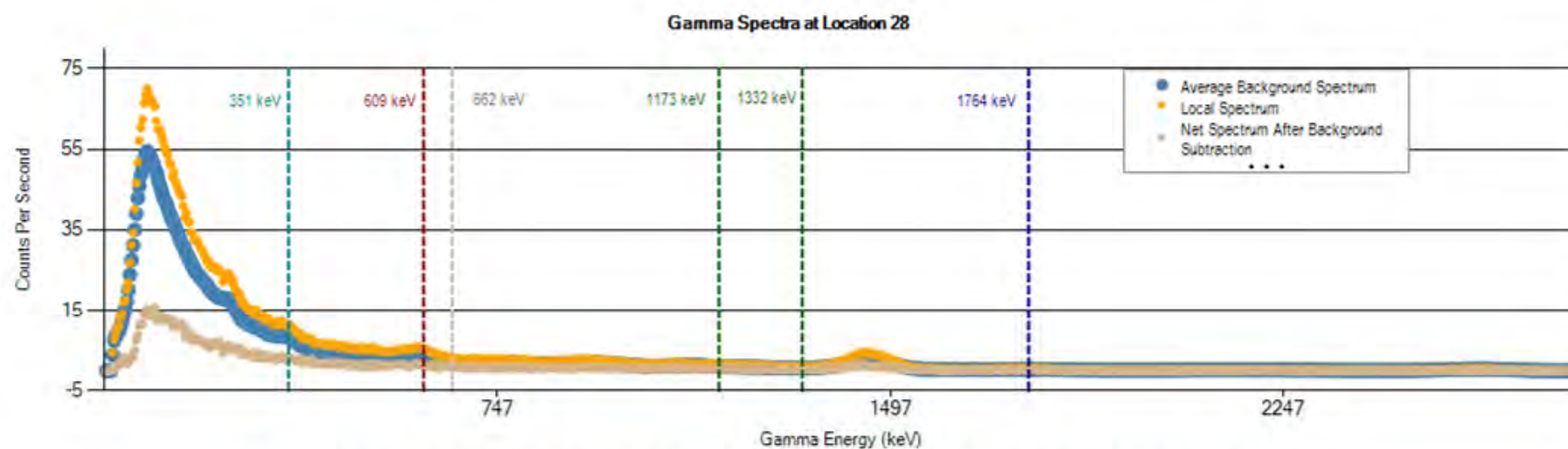
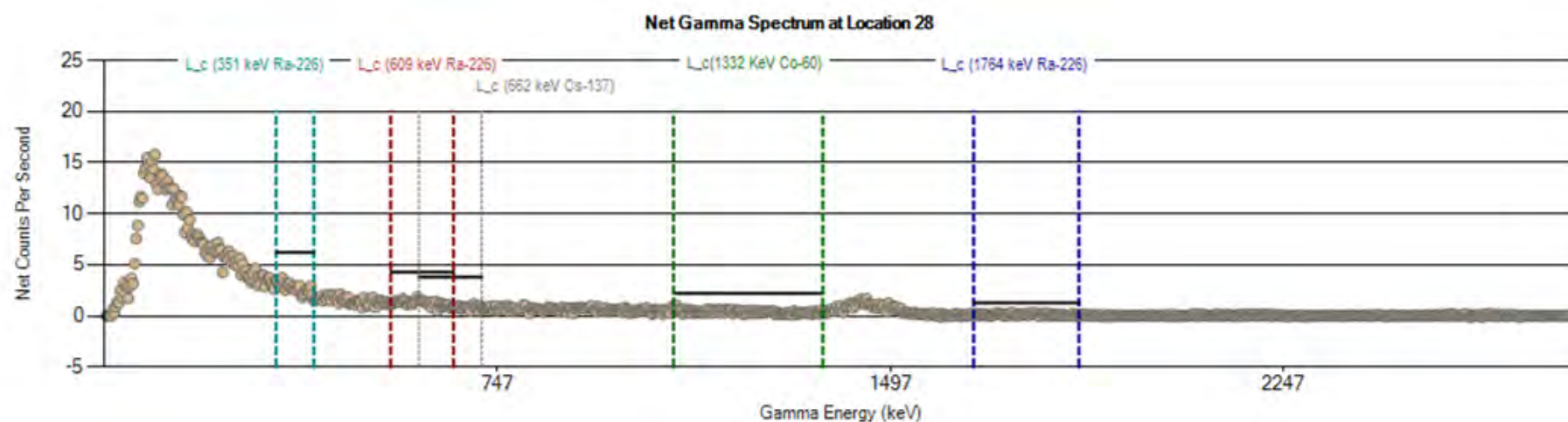
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 25 (cps)	1169	171	27	29	201	184	145	234	128	4677
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



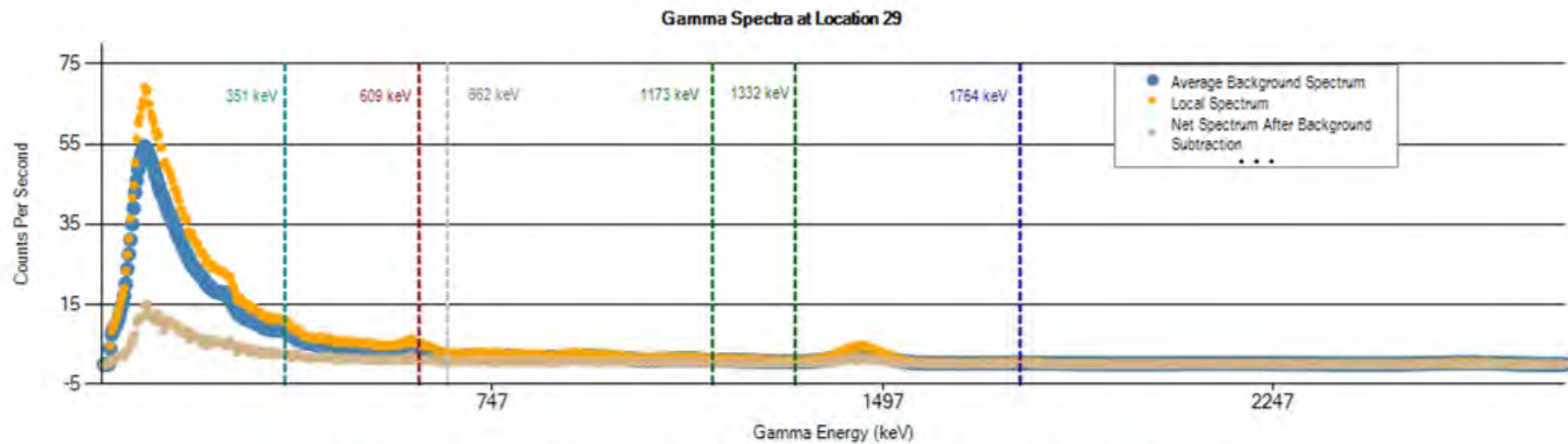
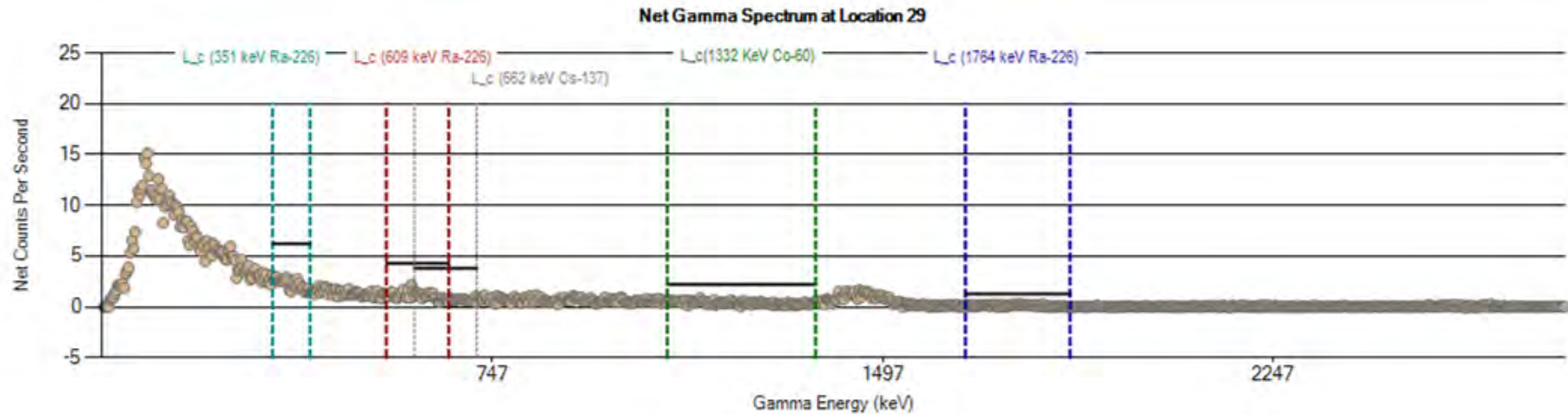
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 26 (cps)	1201	178	27	30	210	193	149	235	130	4712
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



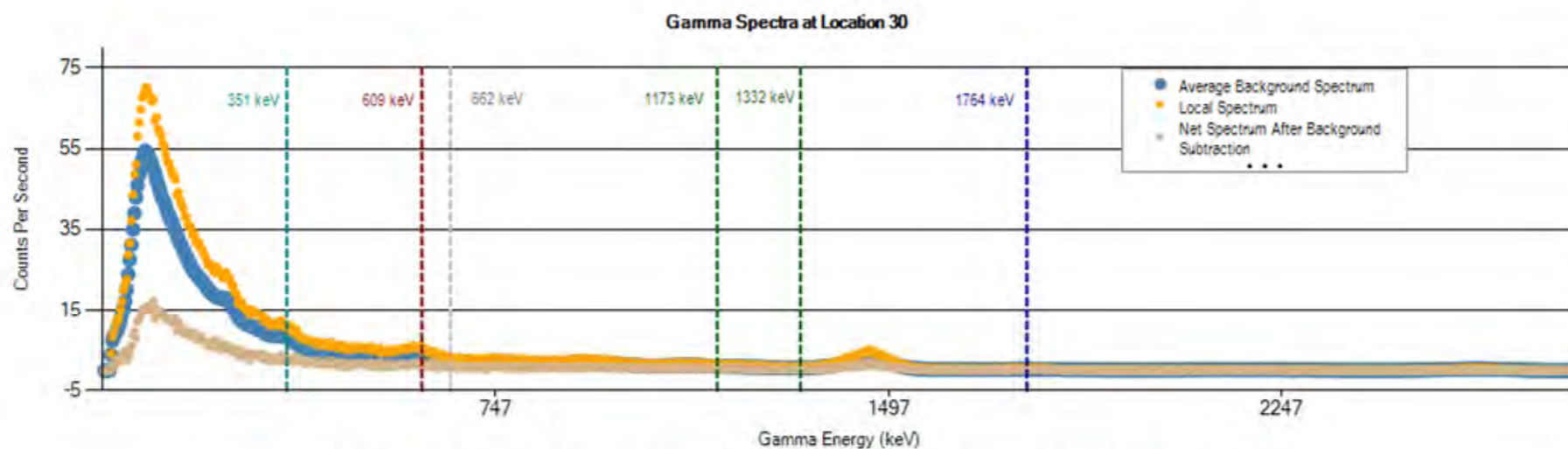
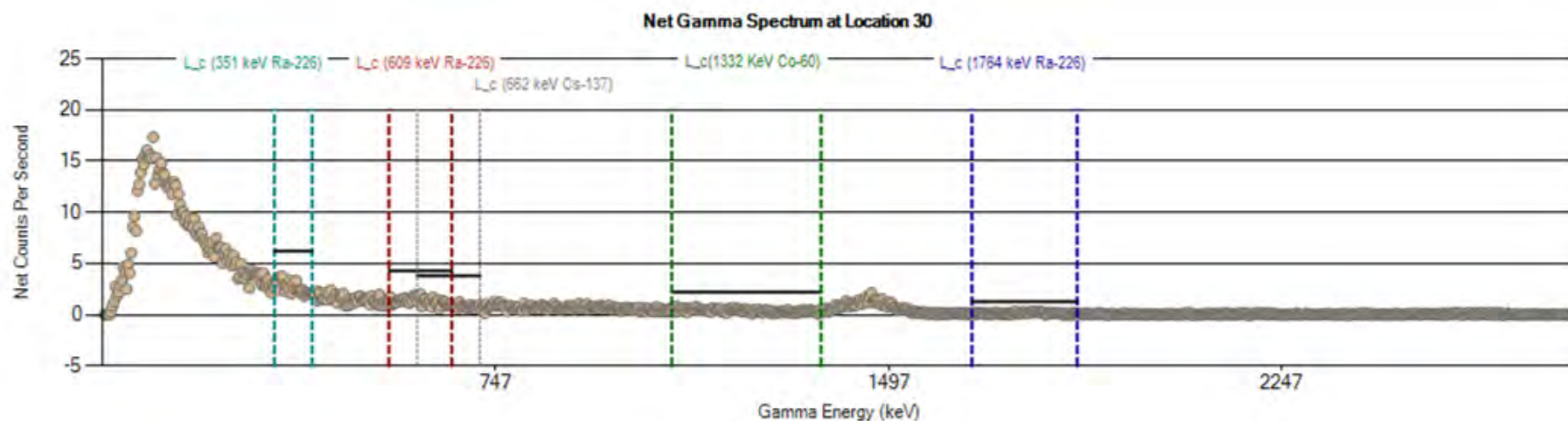
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 27 (cps)	1208	182	27	31	206	192	147	237	133	4848
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



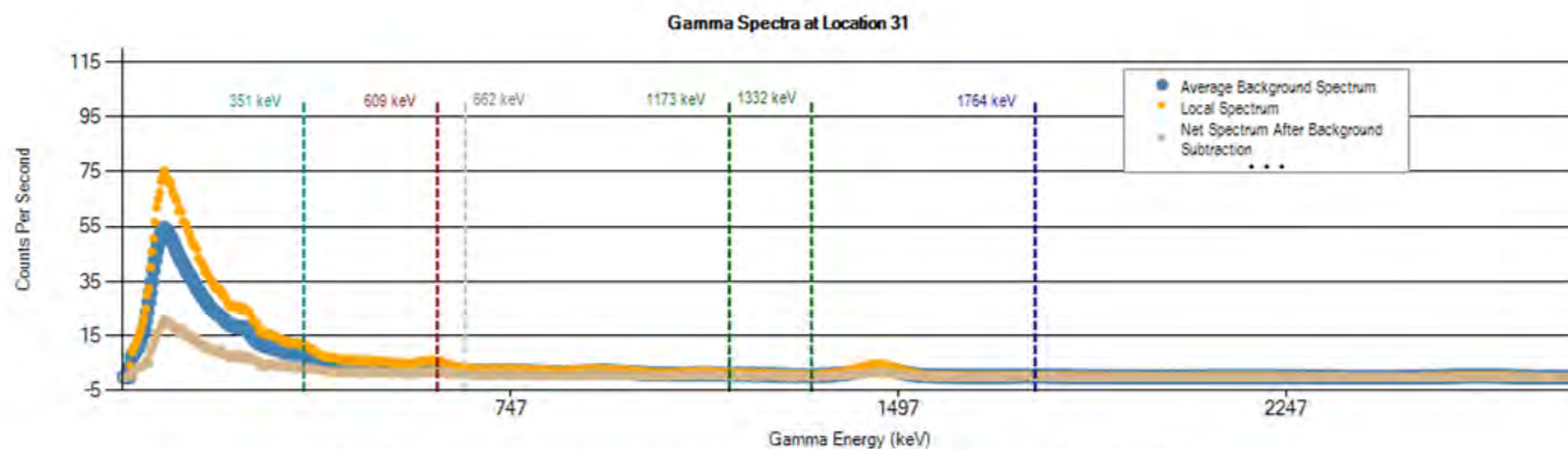
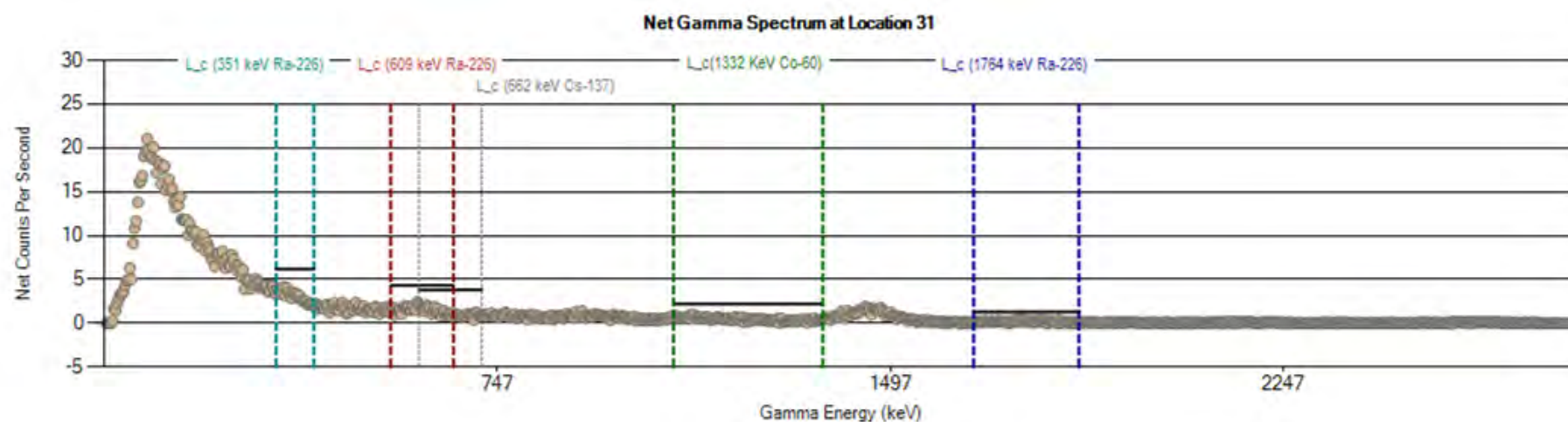
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 28 (cps)	1171	163	29	28	205	191	148	241	126	4746
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



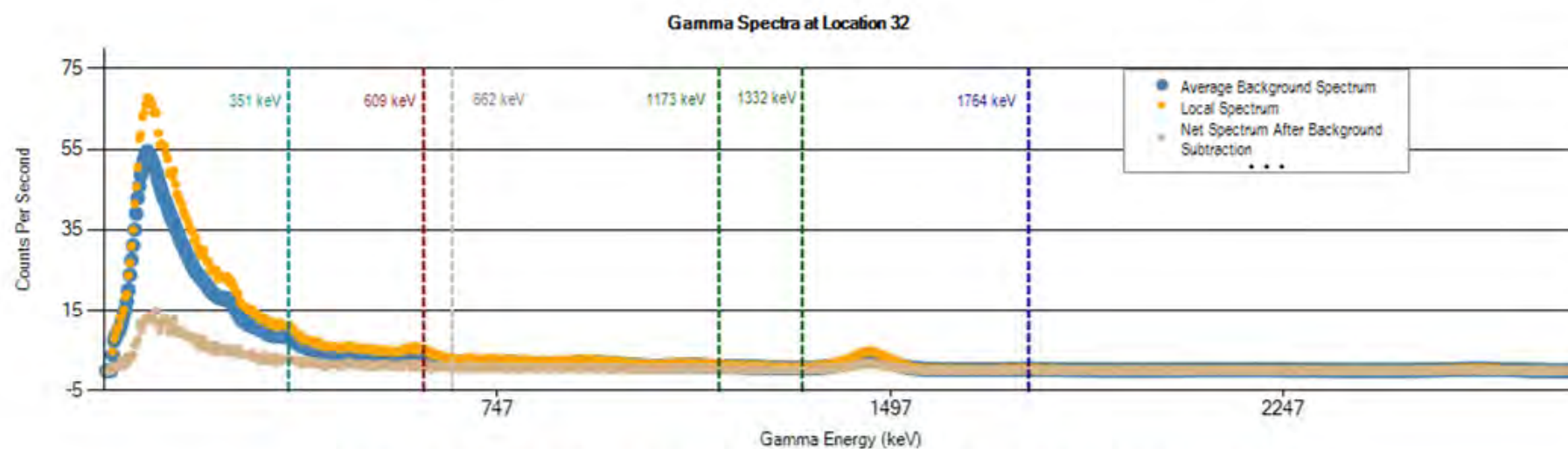
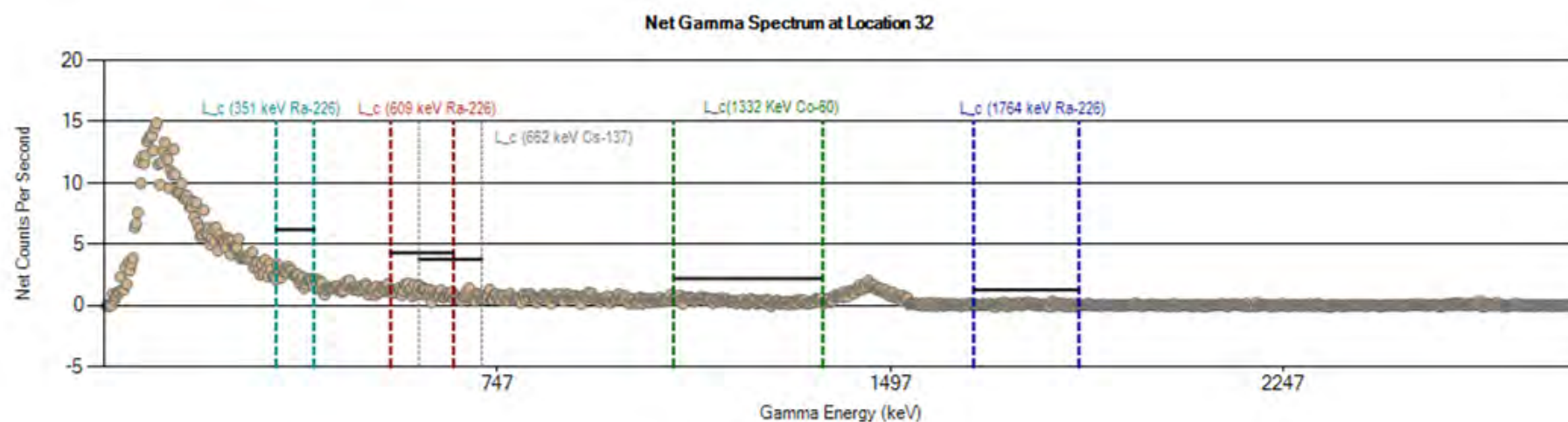
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 29 (cps)	1163	167	28	29	199	185	143	230	126	4639
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



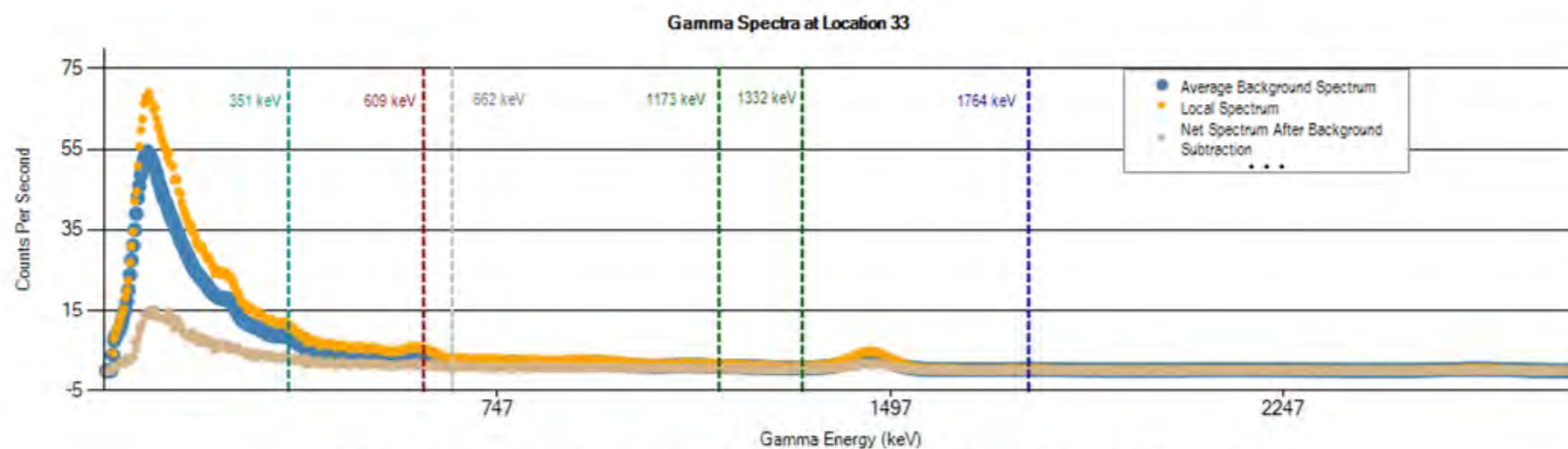
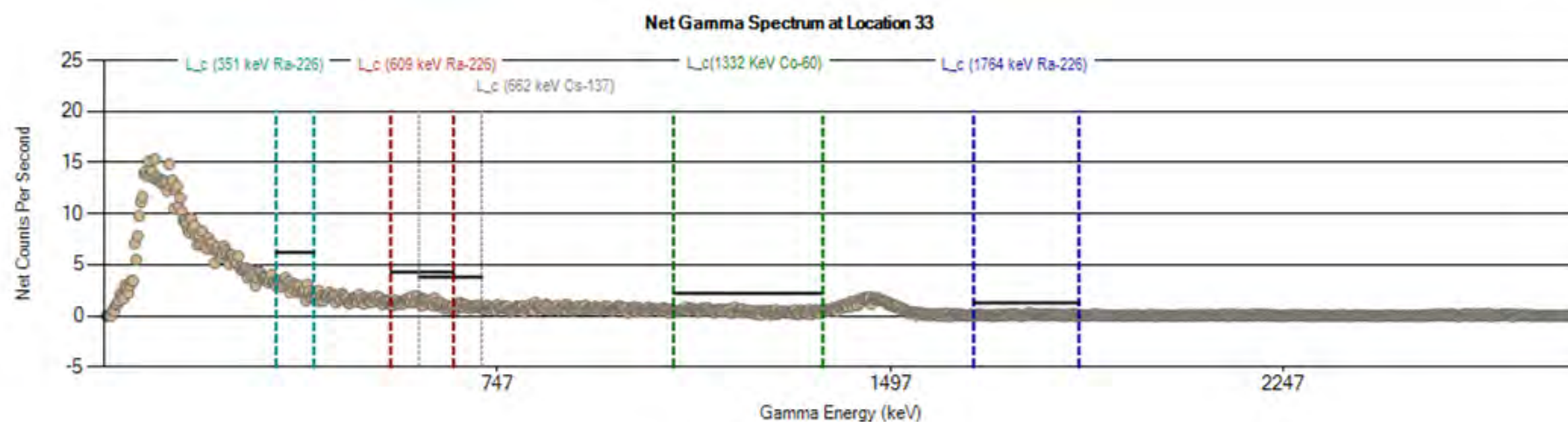
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 30 (cps)	1190	170	30	30	204	193	149	239	127	4808
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



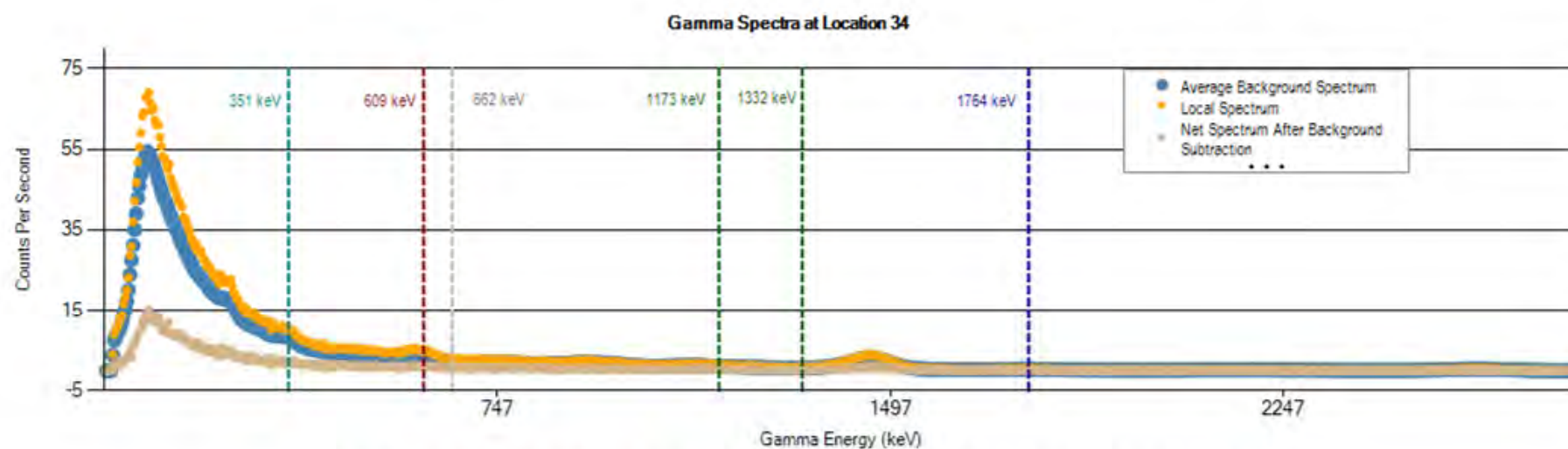
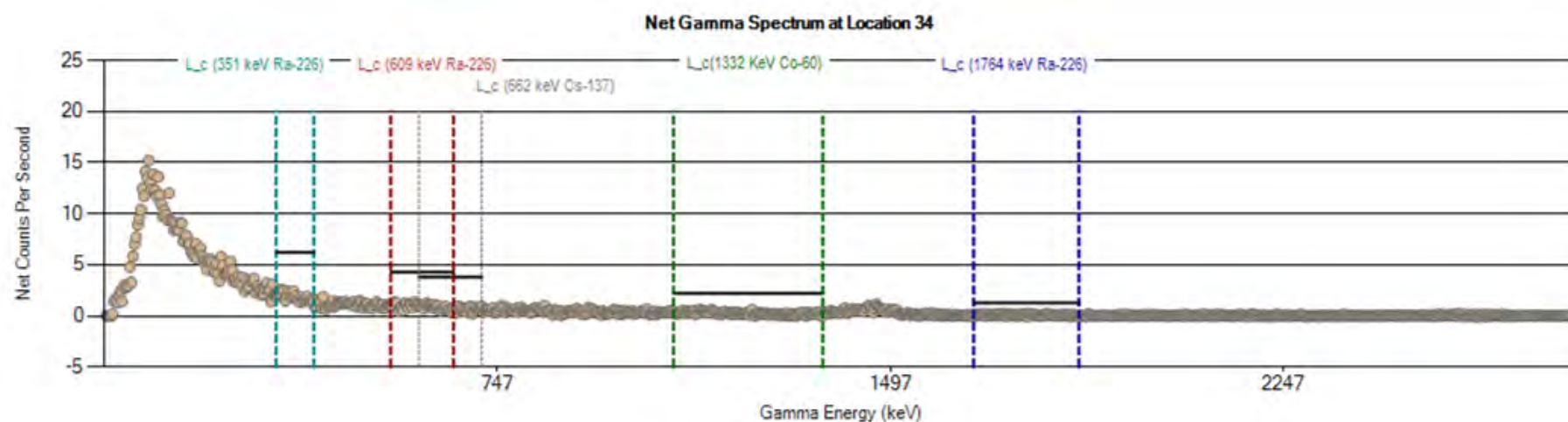
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 31 (cps)	1230	175	32	31	213	201	154	250	132	5039
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



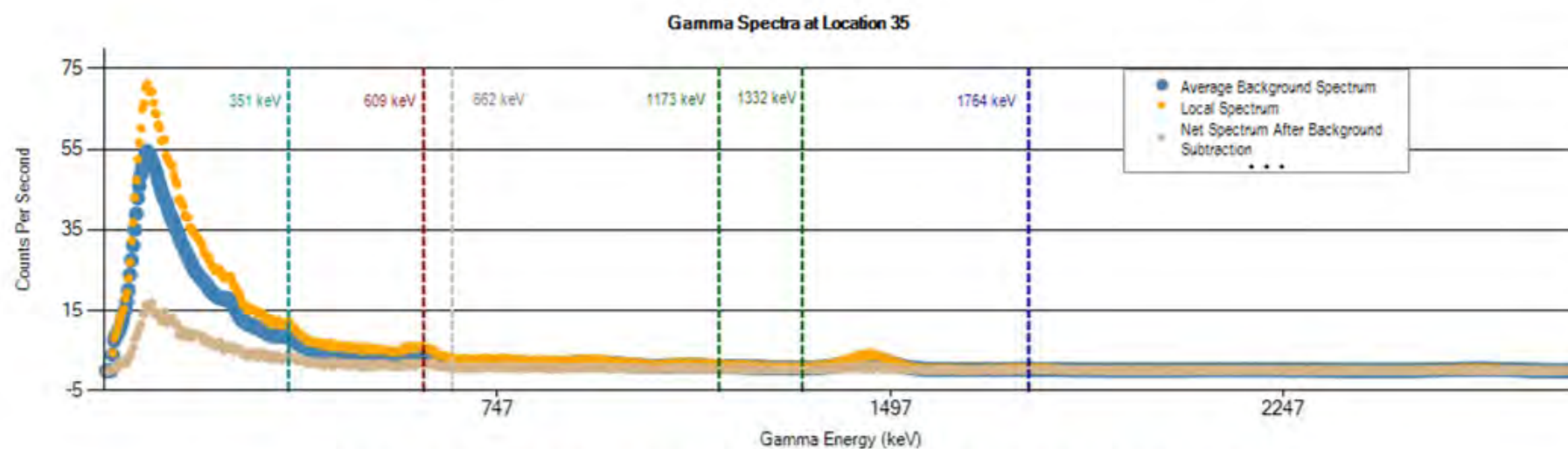
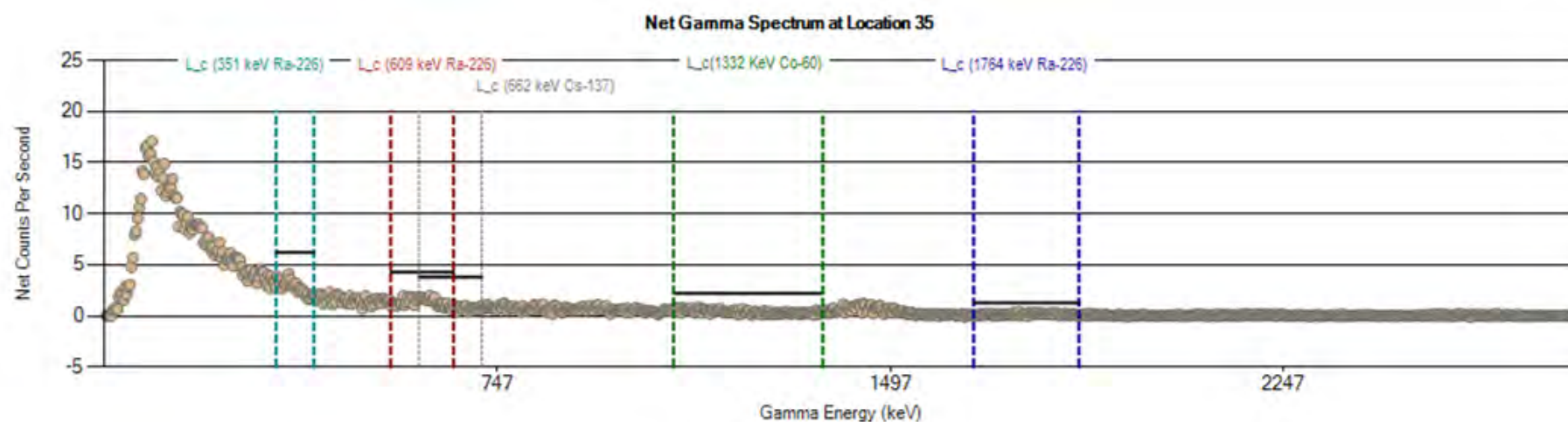
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 32 (cps)	1161	171	26	30	205	186	142	235	125	4664
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



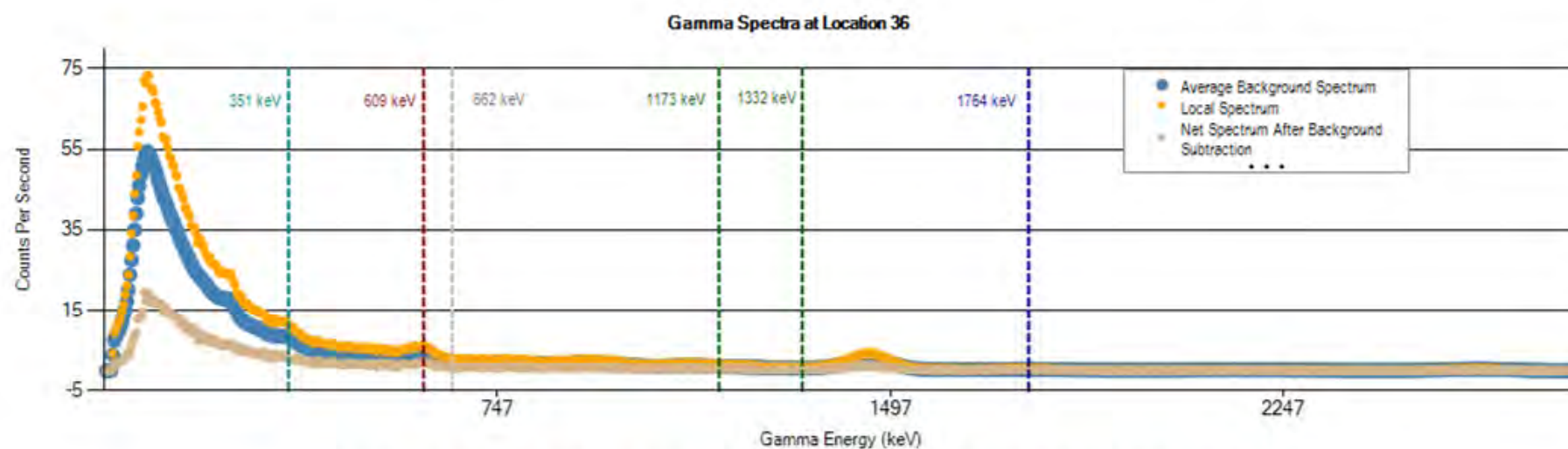
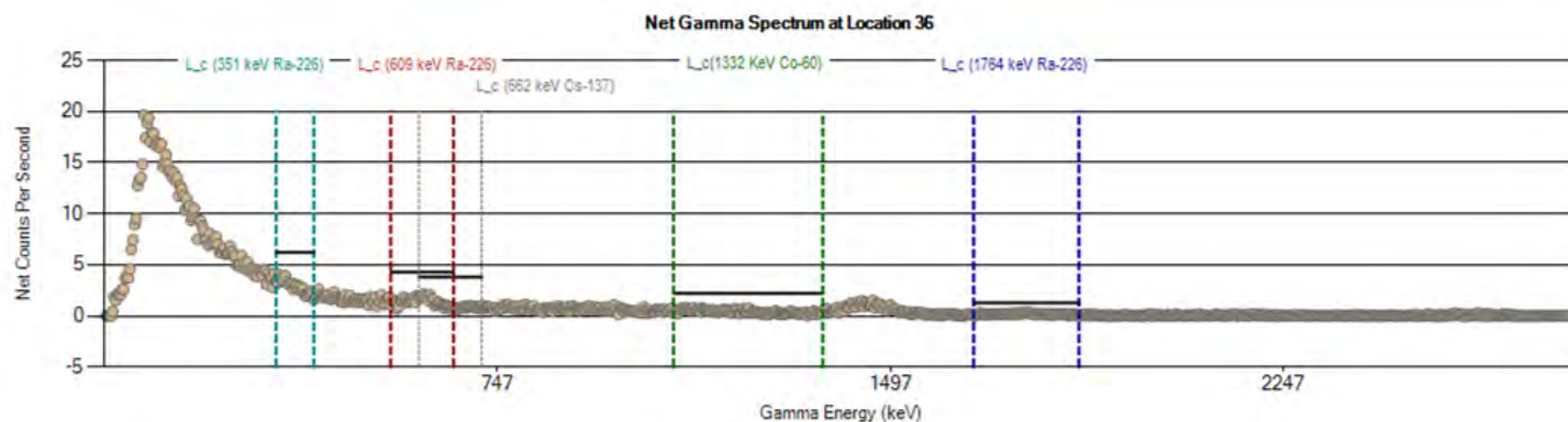
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 33 (cps)	1214	177	27	30	210	192	150	242	132	4799
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



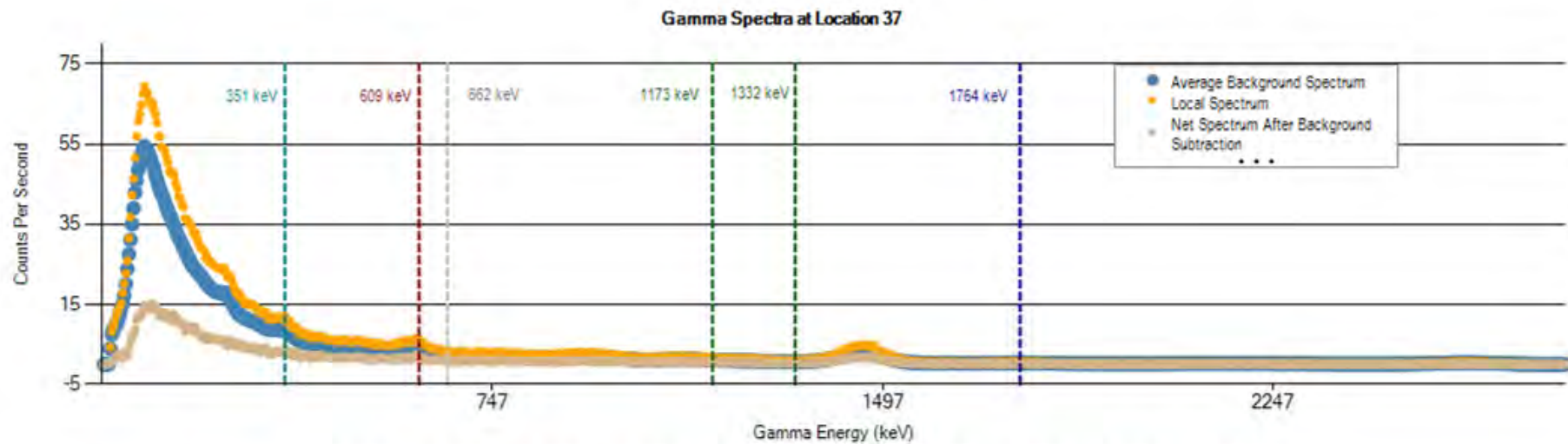
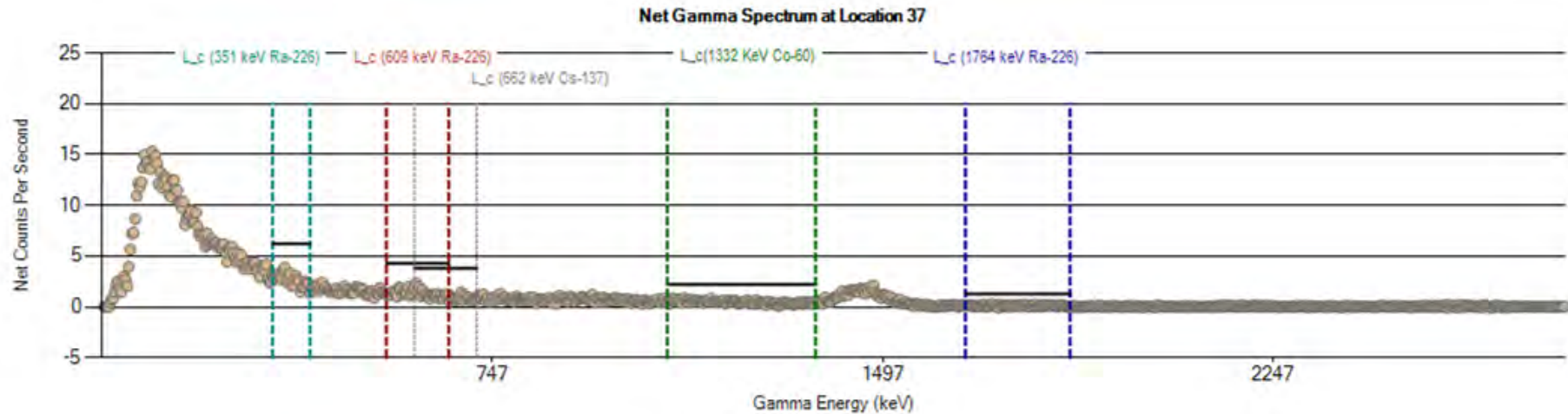
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 34 (cps)	1078	144	26	28	193	177	138	220	114	4507
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



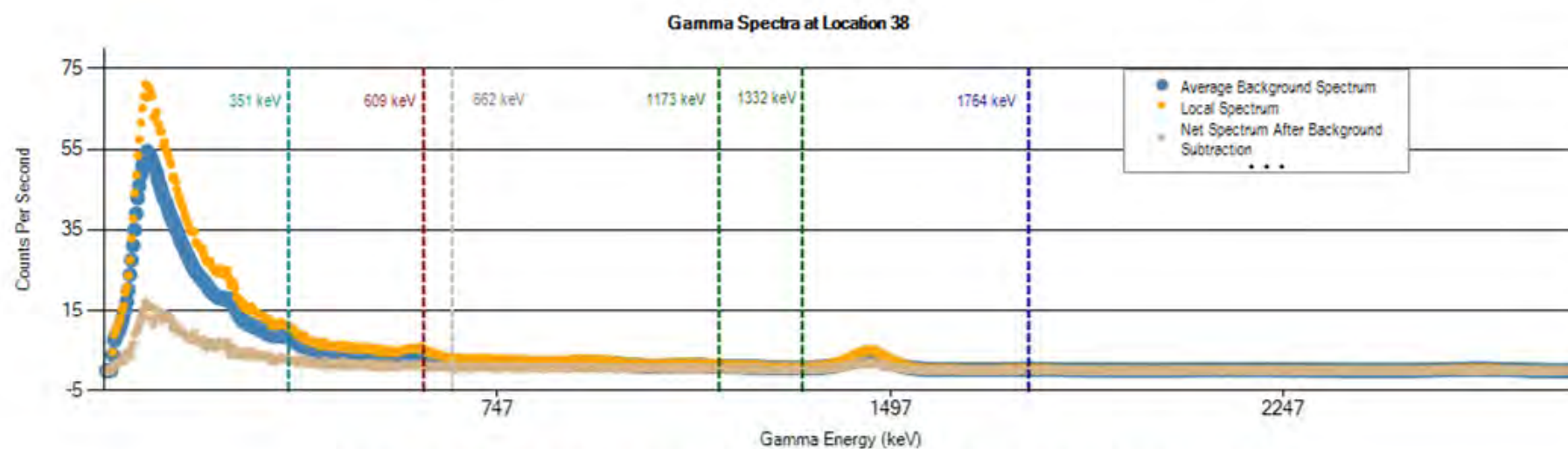
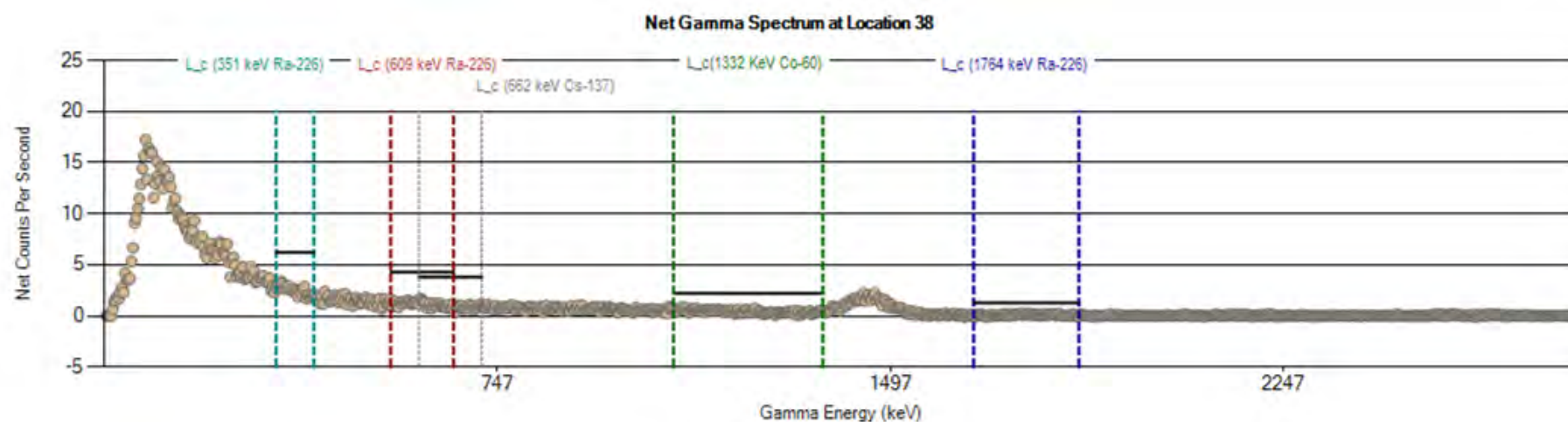
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 35 (cps)	1173	151	31	29	206	196	150	243	126	4782
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



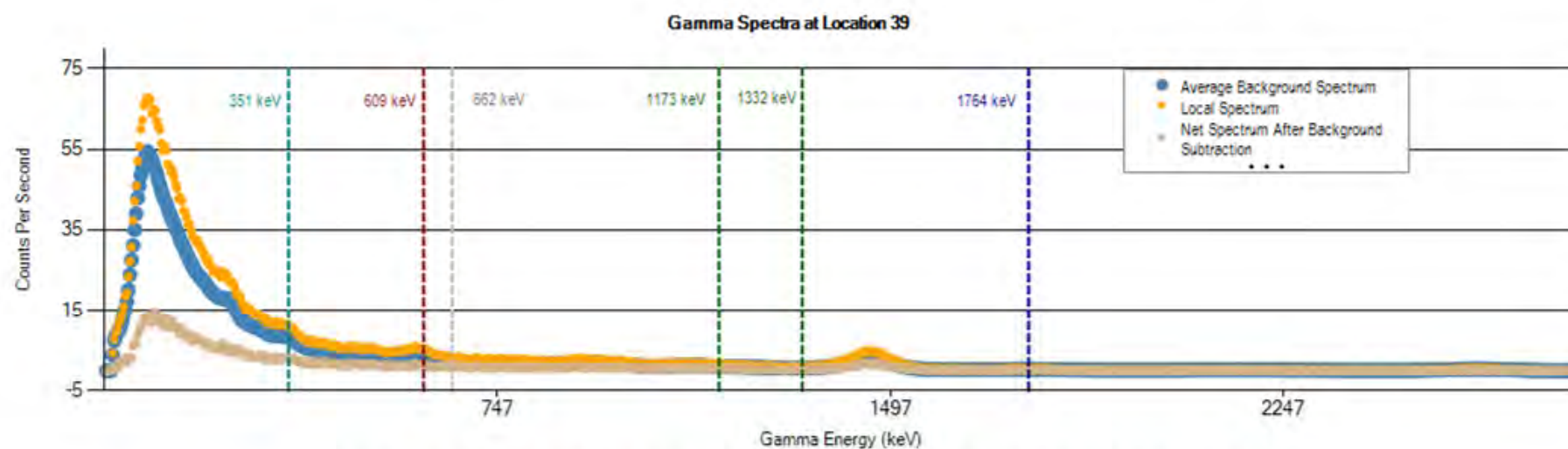
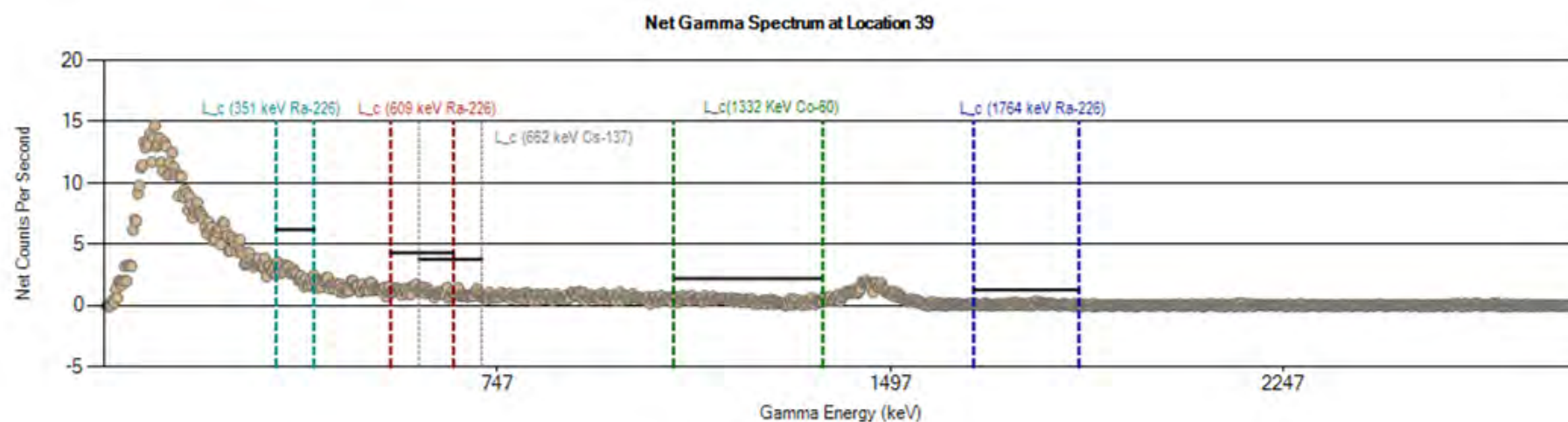
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 36 (cps)	1194	161	32	30	210	197	153	245	128	4920
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



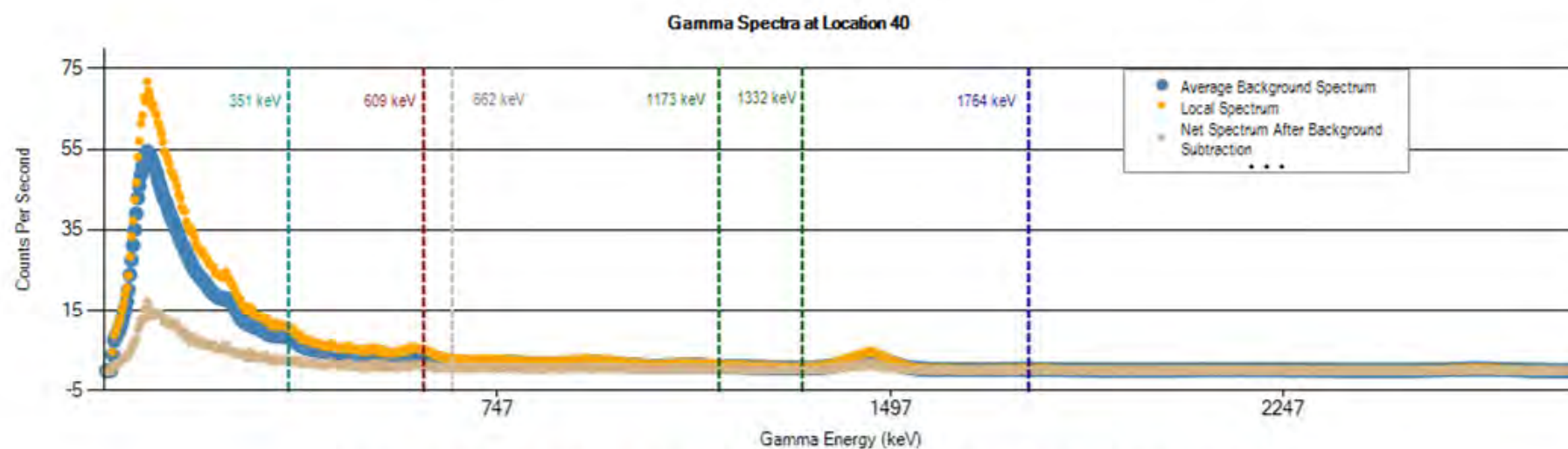
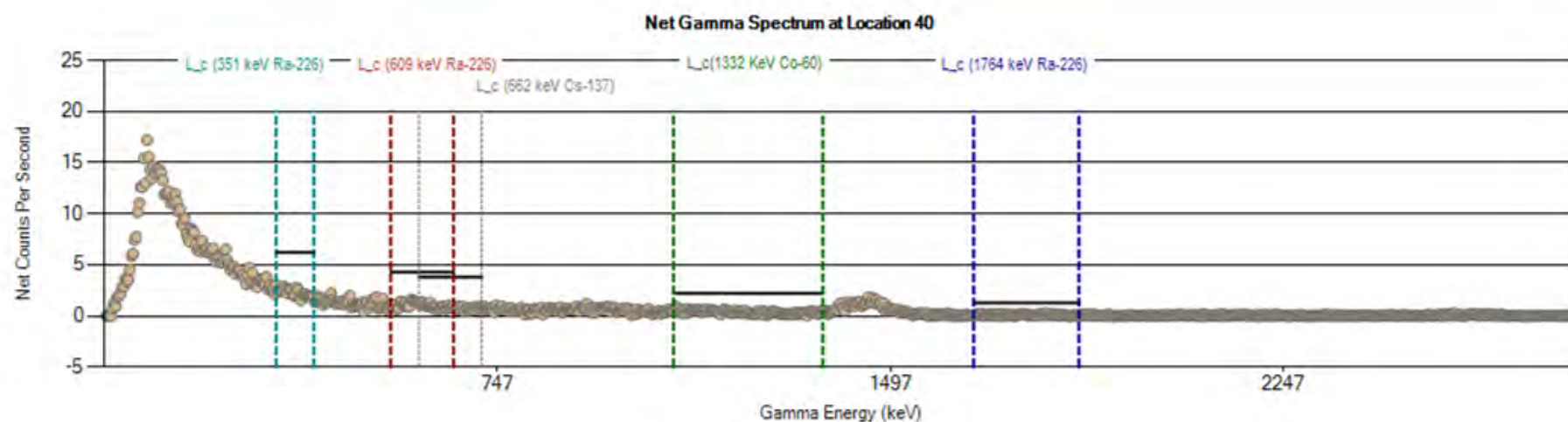
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 37 (cps)	1212	178	28	29	210	194	150	239	133	4797
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



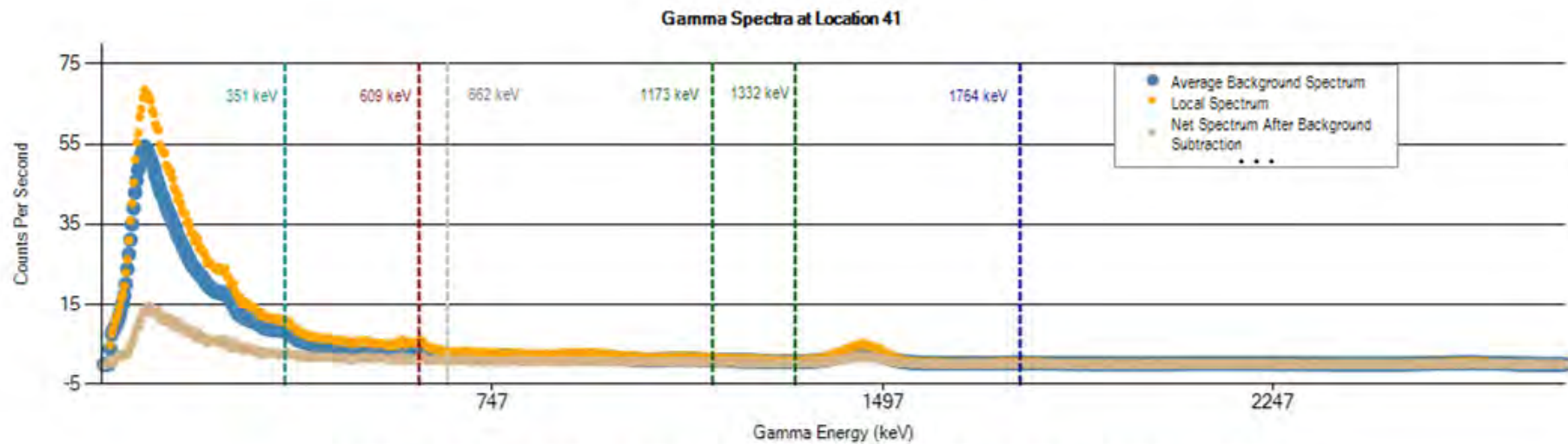
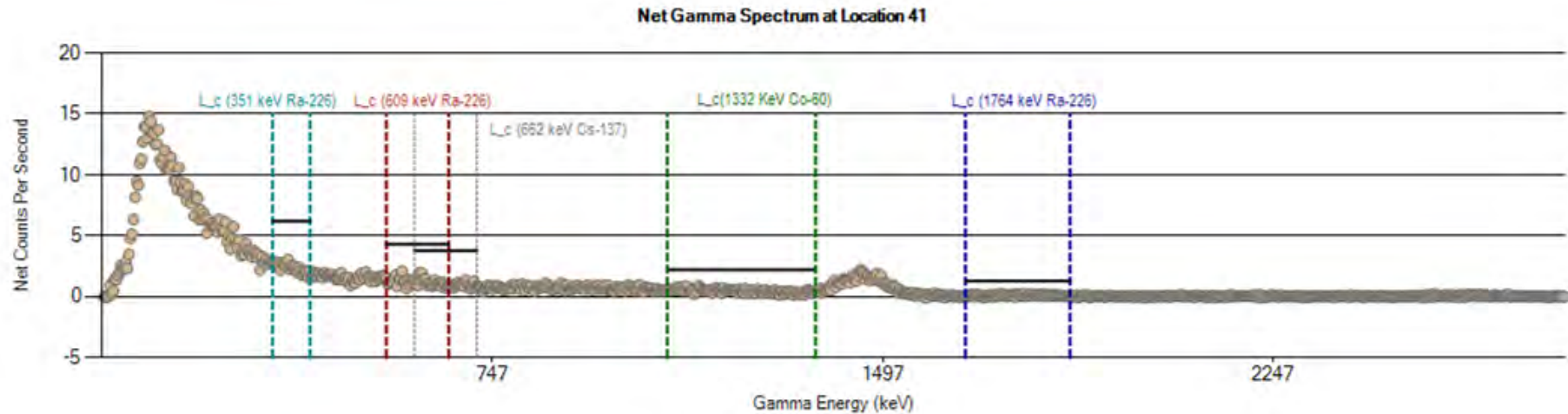
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 38 (cps)	1193	180	26	29	204	187	147	237	130	4777
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



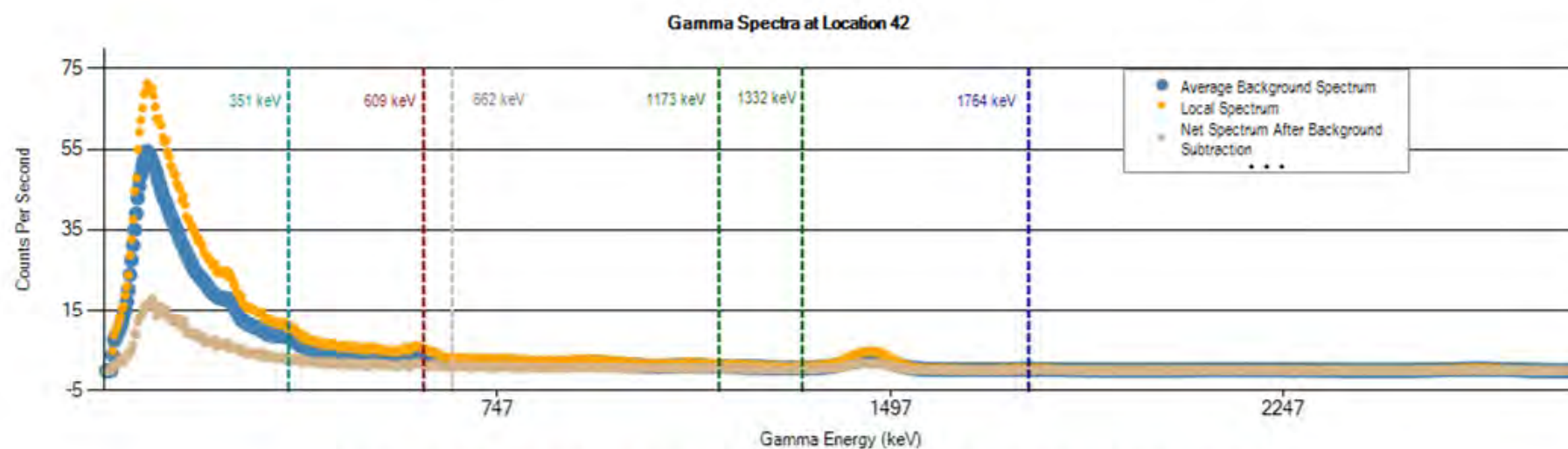
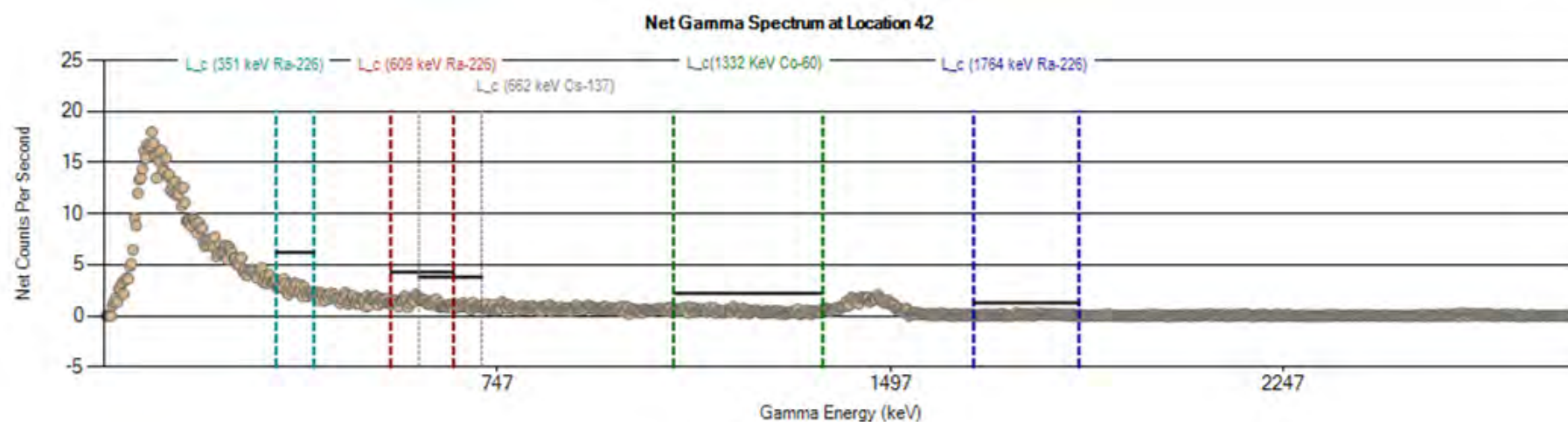
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 39 (cps)	1190	176	27	28	205	188	148	237	127	4727
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 40 (cps)	1145	165	27	30	196	182	142	230	124	4694
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 41 (cps)	1208	181	27	30	209	190	151	233	132	4721
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

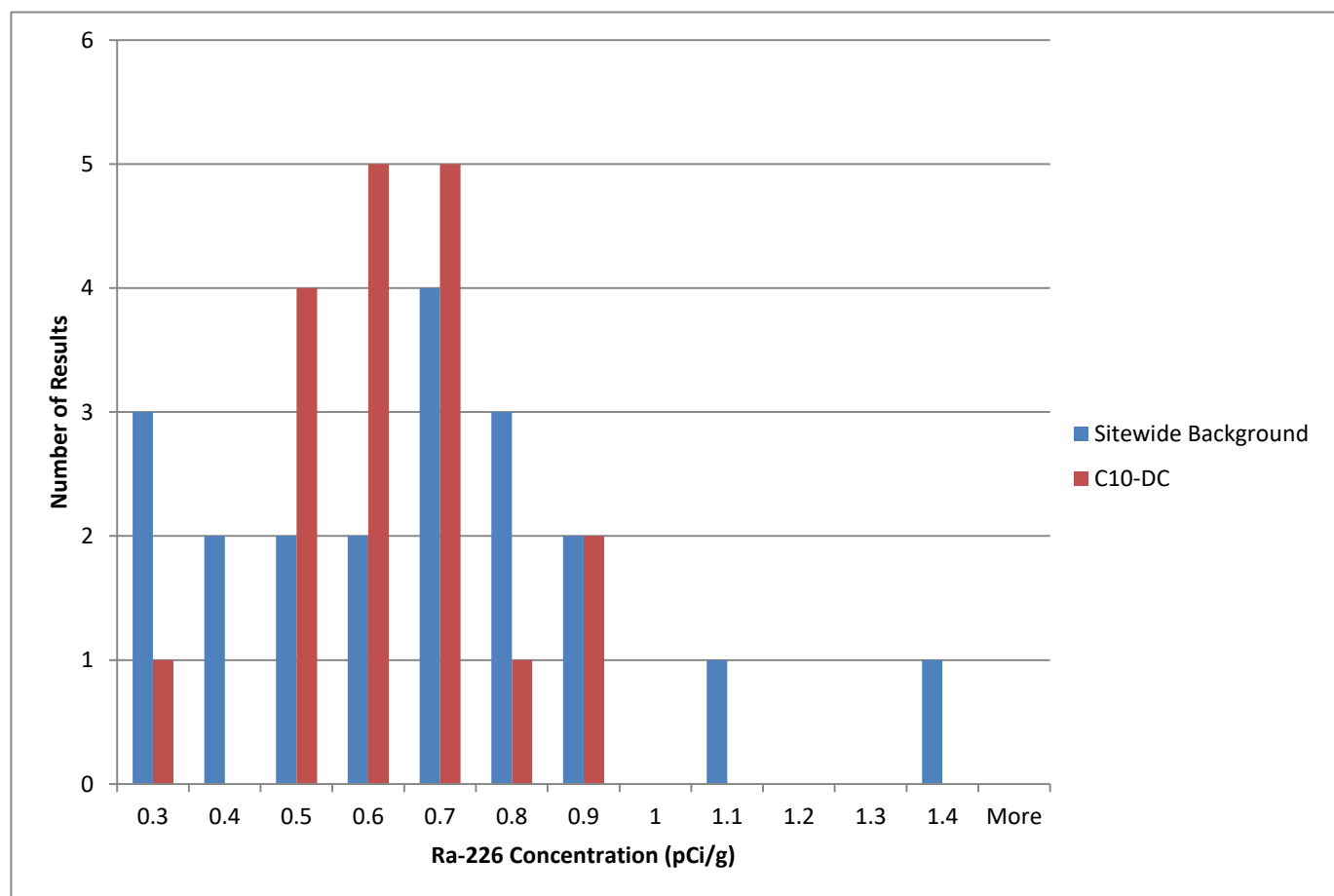


	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 42 (cps)	1220	180	28	30	211	194	152	240	134	4891
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

Histogram, RSY C10 (DC) vs. Sitewide Background

Background	
<i>Bin</i>	<i>Frequency</i>
0.3	3
0.4	2
0.5	2
0.6	2
0.7	4
0.8	3
0.9	2
1	0
1.1	1
1.2	0
1.3	0
1.4	1
More	0

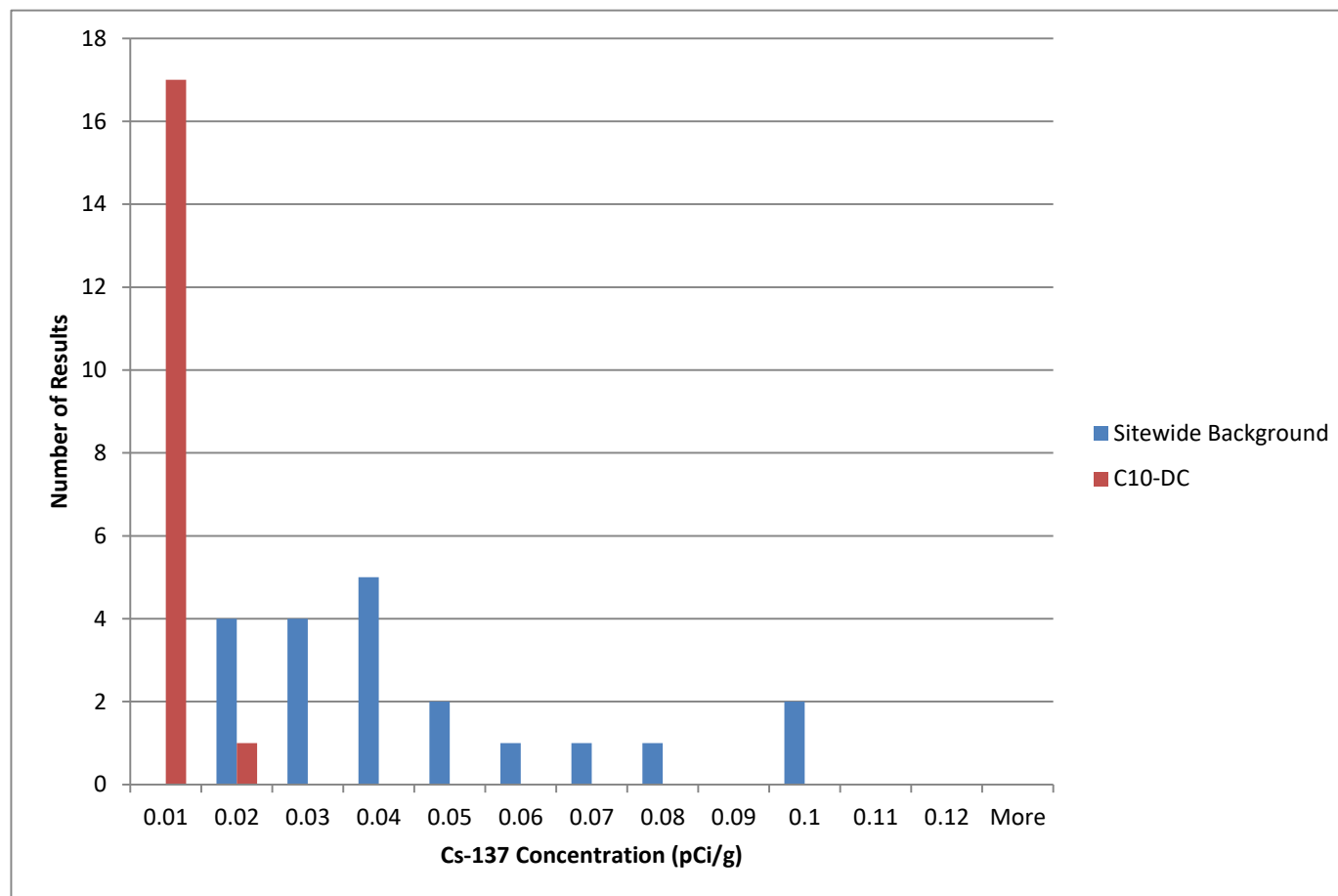
C10-DC	
<i>Bin</i>	<i>Frequency</i>
0.3	1
0.4	0
0.5	4
0.6	5
0.7	5
0.8	1
0.9	2
1	0
1.1	0
1.2	0
1.3	0
1.4	0
More	0



Histogram, RSY C10 (DC) vs. Sitewide Background

Background	
<i>Bin</i>	<i>Frequency</i>
0.01	0
0.02	4
0.03	4
0.04	5
0.05	2
0.06	1
0.07	1
0.08	1
0.09	0
0.1	2
0.11	0
0.12	0
More	0

C10-DC	
<i>Bin</i>	<i>Frequency</i>
0.01	17
0.02	1
0.03	0
0.04	0
0.05	0
0.06	0
0.07	0
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-30729-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

Micha Korrinhizer

Authorized for release by:

10/12/2018 1:31:19 PM

Micha Korrinhizer, Project Management Assistant II
(314)298-8566

micha.korrinhizer@testamericainc.com

Designee for

Rhonda Ridenhower, Manager of Project Management
(314)298-8566

rhonda.ridenhower@testamericainc.com

LINKS

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results through

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www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC
 Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Job ID: 160-30729-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-30729-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup
 Method 3620C: Florisil Cleanup
 Method 3630C: Silica Gel Cleanup
 Method 3640A: Gel-Permeation Cleanup
 Method 3650B: Acid-Base Partition Cleanup
 Method 3660B: Sulfur Cleanup
 Method 3665A: Sulfuric Acid/Permanganate Cleanup

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Job ID: 160-30729-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 09/14/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 19.0° C.

TOTAL BETA STRONTIUM (GFPC)

Samples PE2-RSYC10-DC-S001 (160-30729-1) and PE2-RSYC10-DC-S011 (160-30729-11) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 09/14/2018, prepared on 09/21/2018 and analyzed on 10/11/2018.

The following samples in batch 160-390792 could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: PE2-RSYC10-DC-S001 (160-30729-1), PE2-RSYC10-DC-S011 (160-30729-11) and (160-30729-A-1-A DU). Samples contained rocks of varying sizes and detritus material.

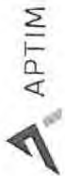
No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples PE2-RSYC10-DC-S001 (160-30729-1), PE2-RSYC10-DC-S002 (160-30729-2), PE2-RSYC10-DC-S003 (160-30729-3), PE2-RSYC10-DC-S004 (160-30729-4), PE2-RSYC10-DC-S005 (160-30729-5), PE2-RSYC10-DC-S006 (160-30729-6), PE2-RSYC10-DC-S007 (160-30729-7), PE2-RSYC10-DC-S008 (160-30729-8), PE2-RSYC10-DC-S009 (160-30729-9), PE2-RSYC10-DC-S010 (160-30729-10), PE2-RSYC10-DC-S011 (160-30729-11), PE2-RSYC10-DC-S012 (160-30729-12), PE2-RSYC10-DC-S013 (160-30729-13), PE2-RSYC10-DC-S014 (160-30729-14), PE2-RSYC10-DC-S015 (160-30729-15), PE2-RSYC10-DC-S016 (160-30729-16), PE2-RSYC10-DC-S017 (160-30729-17) and PE2-RSYC10-DC-S018 (160-30729-18) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 09/14/2018, prepared on 09/18/2018 and analyzed on 10/09/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met for samples PE2-RSYC10-DC-S002 (160-30729-2), PE2-RSYC10-DC-S007 (160-30729-7), PE2-RSYC10-DC-S010 (160-30729-10), PE2-RSYC10-DC-S013 (160-30729-13) and PE2-RSYC10-DC-S018 (160-30729-18) in batch 160-390009. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

CHAIN OF CUSTODY

Ref. Document # PE2_RSYC10_DC#599

Page 1 of 2

Project Number: 500506

CTO-013 RSYC10 Deconstruction
Systematic

Project Name: HPNS - Parcel E-2

Project Location: HPNS - Parcel E-2
Purchase Order #: 202296

Shipment/Pickup Date: 9.13.18

Waybill Number: 12664545 1345990211

Lab Destination: TestAmerica (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63045

Lab Contact Name / ph #: Rhonda Ridenhower (314) 298-8566

Project Manager: Nels Johnson
(Name & phone #)

Send Report To: Eddie Kalombo

Phone/Fax Number: 415-987-0760

Address: 4005 Port Chicago Hwy

City: Concord, CA 94520

Sampler's Name(s): JOAQUIN RAMIREZ

Sample ID Number	Sample Description	Date	Time	Method	Matrix	# of containers	Preservative (water)	Preservative (soil)	Container Type	Gamma Spec (EPA 191.1 M) - (7 day in-growth preliminary results)	Total Strontium (EPA 905 MOD)	Strontium 90 (EPA 905 MOD)	Analyses Requested	Dose Rate μ R/hr
PE2-RSYC10-DC-S001	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0830	G	SO	1	16 oz. plastic jar			X	X	X		5
PE2-RSYC10-DC-S002	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0837	G	SO	1	16 oz. plastic jar			X				5
PE2-RSYC10-DC-S003	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0843	G	SO	1	16 oz. plastic jar			X				5
PE2-RSYC10-DC-S004	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0850	G	SO	1	16 oz. plastic jar			X				5
PE2-RSYC10-DC-S005	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0857	G	SO	1	16 oz. plastic jar			X				5
PE2-RSYC10-DC-S006	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0904	G	SO	1	16 oz. plastic jar			X				5
PE2-RSYC10-DC-S007	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0911	G	SO	1	16 oz. plastic jar			X				5
PE2-RSYC10-DC-S008	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0918	G	SO	1	16 oz. plastic jar			X				5
PE2-RSYC10-DC-S009	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0925	G	SO	1	16 oz. plastic jar			X				5
PE2-RSYC10-DC-S010	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0932	G	SO	1	16 oz. plastic jar			X				5

Special Instructions:

Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g. 7 days ingrown draft and follow with 21 days final.

<input type="checkbox"/> 24-hr		<input type="checkbox"/> 10-day		<input type="checkbox"/> 3-day	
Standard TAT - 10-day		Level Of QC Required		Project Specific:	
Relinquished By: JOAQUIN RAMIREZ	Date: 9.13.18 Time: 1000	I	II	III	Received By: EDDIE KALOMBO Date: 9.13.18 Time: 1000
Relinquished By: EDDIE KALOMBO	Date: 9.13.18 Time: 1600	Received By: Eddie Kalombo		Date: 9-14-18 Time: 0845	
Relinquished By:	Date: Time:	Received By:		Date: Time:	
Relinquished By:	Date: Time:	Received By:		Date: Time:	
Relinquished By:	Date: Time:	Received By:		Date: Time:	
Method Codes		Matrix Codes		A = Air	
C = Composite G = Grab		DW = Drinking Water GW = Ground Water WW = Waste Water		SO = Soil SL = Sludge CP = Chip Samples	
ABS=Asbestos, PO=Pipe Opening					



160-30729 Chain of Custody



APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

CHAIN OF CUSTODY

Ref. Document # PE2_RSYC10_DC#599

Page 2 of 2

Project Number: 500506

CTO-013 RSYC10 Deconstruction
Systematic

Project Name:

Project Location: HPNS - Parcel E-2

Purchase Order #: 202296

Shipment/Pickup Date: 9.13.18

Waybill Number: 12661545 1395940271

Lab Destination: TestAmerica (St. Louis Lab)

13715 Rider Trail North

Earth City, MO 63045

Lab Contact Name / ph #: Rhonda Ridenhower (314) 298-8566

Project Manager: Nels Johnson

(Name & phone #)

Send Report To: Eddie Kalombo

Phone/Fax Number: 415-987-0760

Address: 4005 Port Chicago Hwy

City: Concord, CA, 94520

Sampler's Name(s): JOAQUIN RAMIREZ

Sample ID Number	Sample Description	Date	Time	Method	Matrix	# of containers	Preservative (water)
PE2-RSYC10-DC-S011	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0939	G	SO	1	16 oz. plastic jar
PE2-RSYC10-DC-S012	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0946	G	SO	1	16 oz. plastic jar
PE2-RSYC10-DC-S013	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0952	G	SO	1	16 oz. plastic jar
PE2-RSYC10-DC-S014	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	0959	G	SO	1	16 oz. plastic jar
PE2-RSYC10-DC-S015	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	1008	G	SO	1	16 oz. plastic jar
PE2-RSYC10-DC-S016	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	1019	G	SO	1	16 oz. plastic jar
PE2-RSYC10-DC-S017	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	1026	G	SO	1	16 oz. plastic jar
PE2-RSYC10-DC-S018	Parcel E-2 RSYC10 Deconstruction Systematic	9/12/18	1034	G	SO	1	16 oz. plastic jar

Special Instructions:

Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

7 days ingrown draft and follow with 21 days final.

<input type="checkbox"/> 24-hr		<input type="checkbox"/> 10-day		<input type="checkbox"/> 3-day	
Standard TAT -10-day		Level Of QC Required:		Project Specific:	
Relinquished By: JOAQUIN RAMIREZ	Date: 9.13.18 Time: 1000	I	II	III	Received By: RADIE KALOMBO Date: 9.13.18 Time: 1000
Relinquished By: EDDIE KALOMBO	Date: 9.13.18 Time: 1600				Received By: [Signature] Date: 9-14-18 Time: 0845
Relinquished By:	Date: Time:				Received By: [Signature] Date: Time:
Relinquished By:	Date: Time:				Received By: [Signature] Date: Time:

Method Codes	C = Composite	G = Grab
Matrix Codes	SO = Soil	
	DW = Drinking Water	
	GW = Ground Water	
	WW = Waste Water	
	CP = Chip Samples	
	ABS=Asbestos, PO=Pipe Opening	
	A = Air	

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-30729-2

Login Number: 30729**List Source: TestAmerica St. Louis****List Number: 1****Creator: Press, Nicholas B**

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-30729-1	PE2-RSYC10-DC-S001	Solid	09/12/18 08:30	09/14/18 08:45
160-30729-2	PE2-RSYC10-DC-S002	Solid	09/12/18 08:37	09/14/18 08:45
160-30729-3	PE2-RSYC10-DC-S003	Solid	09/12/18 08:43	09/14/18 08:45
160-30729-4	PE2-RSYC10-DC-S004	Solid	09/12/18 08:50	09/14/18 08:45
160-30729-5	PE2-RSYC10-DC-S005	Solid	09/12/18 08:57	09/14/18 08:45
160-30729-6	PE2-RSYC10-DC-S006	Solid	09/12/18 09:04	09/14/18 08:45
160-30729-7	PE2-RSYC10-DC-S007	Solid	09/12/18 09:11	09/14/18 08:45
160-30729-8	PE2-RSYC10-DC-S008	Solid	09/12/18 09:18	09/14/18 08:45
160-30729-9	PE2-RSYC10-DC-S009	Solid	09/12/18 09:25	09/14/18 08:45
160-30729-10	PE2-RSYC10-DC-S010	Solid	09/12/18 09:32	09/14/18 08:45
160-30729-11	PE2-RSYC10-DC-S011	Solid	09/12/18 09:39	09/14/18 08:45
160-30729-12	PE2-RSYC10-DC-S012	Solid	09/12/18 09:46	09/14/18 08:45
160-30729-13	PE2-RSYC10-DC-S013	Solid	09/12/18 09:52	09/14/18 08:45
160-30729-14	PE2-RSYC10-DC-S014	Solid	09/12/18 09:59	09/14/18 08:45
160-30729-15	PE2-RSYC10-DC-S015	Solid	09/12/18 10:08	09/14/18 08:45
160-30729-16	PE2-RSYC10-DC-S016	Solid	09/12/18 10:19	09/14/18 08:45
160-30729-17	PE2-RSYC10-DC-S017	Solid	09/12/18 10:26	09/14/18 08:45
160-30729-18	PE2-RSYC10-DC-S018	Solid	09/12/18 10:34	09/14/18 08:45

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Client Sample ID: PE2-RSYC10-DC-S001

Date Collected: 09/12/18 08:30

Date Received: 09/14/18 08:45

Lab Sample ID: 160-30729-1

Matrix: Solid

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.00911	U	0.0599	0.0599	0.331	0.0484	pCi/g	09/21/18 12:06	10/11/18 05:10	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	86.2		40 - 110					09/21/18 12:06	10/11/18 05:10	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.622		0.233	0.241		0.0806	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Actinium-227	-0.392	U	0.772	0.774		0.448	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Bismuth-212	0.000	U	0.629	0.629		0.714	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Bismuth-214	0.705		0.150	0.167		0.0475	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Cesium-137	-0.0295	U	0.0708	0.0709	0.0700	0.0600	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Cobalt-60	0.0366		0.0458	0.0460	0.200	0.0276	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Lead-210	-1.01	U	1.83	1.83		1.47	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Lead-212	0.738		0.116	0.150		0.0470	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Lead-214	0.544		0.166	0.176		0.110	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Potassium-40	16.4		1.86	2.51		0.210	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Protactinium-231	0.000	U	0.443	0.443		2.84	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Radium-226	0.705		0.150	0.167	0.700	0.0475	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Radium-228	0.622		0.233	0.241		0.0806	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Thallium-208	0.286		0.0673	0.0736		0.0189	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Thorium-228	0.738		0.116	0.150		0.0470	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Thorium-232	0.622		0.233	0.241		0.0806	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Thorium-234	0.583		0.560	0.563		0.496	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Uranium-235	-0.0440	U	0.331	0.331		0.433	pCi/g	09/18/18 13:54	10/09/18 05:27	1
Uranium-238	0.583		0.560	0.563		0.496	pCi/g	09/18/18 13:54	10/09/18 05:27	1

Client Sample ID: PE2-RSYC10-DC-S002

Date Collected: 09/12/18 08:37

Date Received: 09/14/18 08:45

Lab Sample ID: 160-30729-2

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.797		0.230	0.244		0.0367	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Actinium-227	0.366	U	0.578	0.580		0.391	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Bismuth-212	0.246	U	0.891	0.891		0.711	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Bismuth-214	0.530		0.147	0.157		0.0451	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Cesium-137	-0.0393	U	0.0460	0.0462	0.0700	0.0738	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Cobalt-60	0.0431		0.0621	0.0623	0.200	0.0341	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Lead-210	0.923	U	2.01	2.01		1.62	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Lead-212	0.665		0.113	0.142		0.0478	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Lead-214	0.630		0.165	0.178		0.0708	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Potassium-40	13.0		1.86	2.29		0.259	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Protactinium-231	0.674	U	2.34	2.35		2.61	pCi/g	09/18/18 13:54	10/09/18 06:09	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Client Sample ID: PE2-RSYC10-DC-S002

Lab Sample ID: 160-30729-2

Date Collected: 09/12/18 08:37

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.530		0.147	0.157	0.700	0.0451	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Radium-228	0.797		0.230	0.244		0.0367	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Thallium-208	0.233		0.0703	0.0744		0.0244	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Thorium-228	0.665		0.113	0.142		0.0478	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Thorium-232	0.797		0.230	0.244		0.0367	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Thorium-234	-1.39	U	0.984	0.996		1.17	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Uranium-235	0.0677	U	0.178	0.178		0.474	pCi/g	09/18/18 13:54	10/09/18 06:09	1
Uranium-238	-1.39	U	0.984	0.996		1.17	pCi/g	09/18/18 13:54	10/09/18 06:09	1

Client Sample ID: PE2-RSYC10-DC-S003

Lab Sample ID: 160-30729-3

Date Collected: 09/12/18 08:43

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.762		0.185	0.201		0.0561	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Actinium-227	-0.344	U	1.03	1.03		0.375	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Bismuth-212	0.235	U	0.605	0.606		0.480	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Bismuth-214	0.648		0.130	0.146		0.0446	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Cesium-137	0.00947	U	0.0474	0.0474	0.0700	0.0383	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Cobalt-60	0.0279	U	0.0304	0.0306	0.200	0.0362	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Lead-210	0.643	U	1.42	1.42		1.14	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Lead-212	0.755		0.0944	0.136		0.0409	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Lead-214	0.594		0.104	0.121		0.0473	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Potassium-40	16.7		1.50	2.28		0.196	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Protactinium-231	0.000	U	0.352	0.352		1.93	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Radium-226	0.648		0.130	0.146	0.700	0.0446	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Radium-228	0.762		0.185	0.201		0.0561	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Thallium-208	0.272		0.0578	0.0643		0.0178	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Thorium-228	0.755		0.0944	0.136		0.0409	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Thorium-232	0.762		0.185	0.201		0.0561	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Thorium-234	0.264	U	0.421	0.422		0.334	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Uranium-235	0.162	U	0.112	0.113		0.396	pCi/g	09/18/18 13:54	10/09/18 06:08	1
Uranium-238	0.264	U	0.421	0.422		0.334	pCi/g	09/18/18 13:54	10/09/18 06:08	1

Client Sample ID: PE2-RSYC10-DC-S004

Lab Sample ID: 160-30729-4

Date Collected: 09/12/18 08:50

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.486		0.176	0.183		0.114	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Actinium-227	0.134	U	0.486	0.486		0.285	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Bismuth-212	0.161	U	0.600	0.600		0.479	pCi/g	09/18/18 13:54	10/09/18 07:07	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Client Sample ID: PE2-RSYC10-DC-S004

Lab Sample ID: 160-30729-4

Date Collected: 09/12/18 08:50

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	0.564		0.123	0.136		0.0443	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Cesium-137	-0.0170	U	0.0538	0.0538	0.0700	0.0429	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Cobalt-60	-0.00656	U	0.0207	0.0207	0.200	0.0369	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Lead-210	-0.516	U	1.54	1.54		1.24	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Lead-212	0.527		0.0870	0.111		0.0390	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Lead-214	0.589		0.106	0.123		0.0515	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Potassium-40	10.8		1.33	1.73		0.231	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Protactinium-231	0.352	U	1.34	1.34		2.08	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Radium-226	0.564		0.123	0.136	0.700	0.0443	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Radium-228	0.486		0.176	0.183		0.114	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Thallium-208	0.191		0.0538	0.0574		0.0165	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Thorium-228	0.527		0.0870	0.111		0.0390	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Thorium-232	0.486		0.176	0.183		0.114	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Thorium-234	0.109	U	0.168	0.168		0.944	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Uranium-235	0.128	U	0.284	0.285		0.259	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Uranium-238	0.109	U	0.168	0.168		0.944	pCi/g	09/18/18 13:54	10/09/18 07:07	1

Client Sample ID: PE2-RSYC10-DC-S005

Lab Sample ID: 160-30729-5

Date Collected: 09/12/18 08:57

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.952		0.293	0.309		0.0988	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Actinium-227	0.260	U	0.610	0.611		0.388	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Bismuth-212	0.417	U	0.772	0.773		0.596	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Bismuth-214	0.602		0.150	0.163		0.0557	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Cesium-137	-0.00174	U	0.0702	0.0702	0.0700	0.0577	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Cobalt-60	-0.0174	U	0.0760	0.0760	0.200	0.0508	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Lead-210	1.21		1.29	1.29		0.841	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Lead-212	0.676		0.116	0.145		0.0585	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Lead-214	0.614		0.132	0.146		0.0524	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Potassium-40	16.5		1.91	2.54		0.128	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Protactinium-231	0.000	U	0.348	0.348		2.48	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Radium-226	0.602		0.150	0.163	0.700	0.0557	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Radium-228	0.952		0.293	0.309		0.0988	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Thallium-208	0.271		0.0783	0.0832		0.0317	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Thorium-228	0.676		0.116	0.145		0.0585	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Thorium-232	0.952		0.293	0.309		0.0988	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Thorium-234	-0.870	U	0.601	0.609		1.43	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Uranium-235	-0.233	U	0.653	0.653		0.533	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Uranium-238	-0.870	U	0.601	0.609		1.43	pCi/g	09/18/18 13:54	10/09/18 07:07	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Client Sample ID: PE2-RSYC10-DC-S006

Lab Sample ID: 160-30729-6

Date Collected: 09/12/18 09:04

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	1.05		0.232	0.255		0.0298	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Actinium-227	0.315	U	0.470	0.471		0.317	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Bismuth-212	0.424	U	0.808	0.809		0.629	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Bismuth-214	0.628		0.139	0.154		0.0393	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Cesium-137	-0.0589	U	0.0819	0.0821	0.0700	0.0628	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Cobalt-60	0.00230	U	0.0324	0.0324	0.200	0.0479	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Lead-210	0.749	U	1.63	1.63		1.31	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Lead-212	0.727		0.110	0.145		0.0497	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Lead-214	0.720		0.120	0.142		0.0598	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Potassium-40	14.5		1.76	2.31		0.210	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Protactinium-231	0.000	U	0.644	0.644		2.42	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Radium-226	0.628		0.139	0.154	0.700	0.0393	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Radium-228	1.05		0.232	0.255		0.0298	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Thallium-208	0.218		0.0805	0.0836		0.0322	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Thorium-228	0.727		0.110	0.145		0.0497	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Thorium-232	1.05		0.232	0.255		0.0298	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Thorium-234	0.530		0.568	0.571		0.478	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Uranium-235	-0.238	U	0.326	0.327		0.451	pCi/g	09/18/18 13:54	10/09/18 07:07	1
Uranium-238	0.530		0.568	0.571		0.478	pCi/g	09/18/18 13:54	10/09/18 07:07	1

Client Sample ID: PE2-RSYC10-DC-S007

Lab Sample ID: 160-30729-7

Date Collected: 09/12/18 09:11

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.979		0.202	0.225		0.0365	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Actinium-227	-0.505	U	0.785	0.788		0.645	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Bismuth-212	2.34		0.684	0.726		0.116	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Bismuth-214	0.494		0.165	0.173		0.0707	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Cesium-137	-0.0622	U	0.104	0.104	0.0700	0.0757	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Cobalt-60	0.0245	U	0.0683	0.0683	0.200	0.0491	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Lead-210	-0.529	U	1.71	1.71		1.22	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Lead-212	0.809		0.120	0.159		0.0459	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Lead-214	0.797		0.153	0.174		0.0590	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Potassium-40	18.3		2.27	2.94		0.406	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Protactinium-231	0.000	U	1.10	1.10		2.50	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Radium-226	0.494		0.165	0.173	0.700	0.0707	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Radium-228	0.979		0.202	0.225		0.0365	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Thallium-208	0.283		0.0761	0.0816		0.0237	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Thorium-228	0.809		0.120	0.159		0.0459	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Thorium-232	0.979		0.202	0.225		0.0365	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Thorium-234	0.995		0.578	0.588		0.467	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Uranium-235	0.121	U	0.386	0.386		0.313	pCi/g	09/18/18 13:54	10/09/18 07:09	1
Uranium-238	0.995		0.578	0.588		0.467	pCi/g	09/18/18 13:54	10/09/18 07:09	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Client Sample ID: PE2-RSYC10-DC-S008

Lab Sample ID: 160-30729-8

Date Collected: 09/12/18 09:18

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	1.06		0.205	0.231		0.0513	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Actinium-227	-0.425	U	0.844	0.845		0.513	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Bismuth-212	1.63		0.560	0.584		0.197	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Bismuth-214	0.907		0.200	0.220		0.0661	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Cesium-137	-0.0423	U	0.0740	0.0741	0.0700	0.0578	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Cobalt-60	0.00668	U	0.0641	0.0641	0.200	0.0364	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Lead-210	-0.716	U	2.20	2.21		1.83	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Lead-212	0.659		0.118	0.137		0.0644	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Lead-214	0.991		0.164	0.192		0.0681	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Potassium-40	18.6		1.93	2.69		0.235	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Protactinium-231	-0.584	U	3.34	3.35		2.74	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Radium-226	0.907		0.200	0.220	0.700	0.0661	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Radium-228	1.06		0.205	0.231		0.0513	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Thallium-208	0.317		0.0732	0.0800		0.0221	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Thorium-228	0.659		0.118	0.137		0.0644	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Thorium-232	1.06		0.205	0.231		0.0513	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Thorium-234	-1.00	U	0.813	0.820		1.04	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Uranium-235	-0.0279	U	0.0529	0.0530		0.621	pCi/g	09/18/18 13:54	10/09/18 07:35	1
Uranium-238	-1.00	U	0.813	0.820		1.04	pCi/g	09/18/18 13:54	10/09/18 07:35	1

Client Sample ID: PE2-RSYC10-DC-S009

Lab Sample ID: 160-30729-9

Date Collected: 09/12/18 09:25

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	1.03		0.188	0.216		0.0463	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Actinium-227	0.209	U	0.478	0.479		0.304	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Bismuth-212	1.27		0.596	0.610		0.258	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Bismuth-214	0.318		0.133	0.137		0.133	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Cesium-137	-0.0219	U	0.0600	0.0601	0.0700	0.0478	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Cobalt-60	-0.00240	U	0.0179	0.0179	0.200	0.0367	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Lead-210	0.294	U	1.12	1.12		0.813	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Lead-212	0.727		0.105	0.141		0.0489	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Lead-214	0.734		0.137	0.157		0.0527	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Potassium-40	16.6		1.65	2.36		0.239	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Protactinium-231	0.000	U	0.607	0.607		2.19	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Radium-226	0.318		0.133	0.137	0.700	0.133	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Radium-228	1.03		0.188	0.216		0.0463	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Thallium-208	0.263		0.0712	0.0763		0.0293	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Thorium-228	0.727		0.105	0.141		0.0489	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Thorium-232	1.03		0.188	0.216		0.0463	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Thorium-234	-0.369	U	1.08	1.08		0.900	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Uranium-235	0.103	U	0.394	0.394		0.314	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Uranium-238	-0.369	U	1.08	1.08		0.900	pCi/g	09/18/18 13:54	10/09/18 07:36	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Client Sample ID: PE2-RSYC10-DC-S010

Lab Sample ID: 160-30729-10

Date Collected: 09/12/18 09:32

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	1.01		0.208	0.232		0.0780	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Actinium-227	0.349	U	0.665	0.666		0.400	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Bismuth-212	0.582	U	1.03	1.04		0.810	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Bismuth-214	0.672		0.196	0.208		0.0749	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Cesium-137	-0.0695	U	0.140	0.140	0.0700	0.0876	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Cobalt-60	-0.00179	U	0.0853	0.0853	0.200	0.0422	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Lead-210	0.480	U	1.40	1.41		1.02	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Lead-212	0.725		0.122	0.144		0.0597	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Lead-214	0.778		0.176	0.193		0.0725	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Potassium-40	19.1		2.16	2.90		0.441	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Protactinium-231	-0.0574	U	0.159	0.159		2.95	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Radium-226	0.672		0.196	0.208	0.700	0.0749	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Radium-228	1.01		0.208	0.232		0.0780	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Thallium-208	0.356		0.0922	0.0990		0.0313	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Thorium-228	0.725		0.122	0.144		0.0597	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Thorium-232	1.01		0.208	0.232		0.0780	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Thorium-234	0.275	U	0.642	0.643		0.603	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Uranium-235	0.0779	U	0.170	0.171		0.608	pCi/g	09/18/18 13:54	10/09/18 07:36	1
Uranium-238	0.275	U	0.642	0.643		0.603	pCi/g	09/18/18 13:54	10/09/18 07:36	1

Client Sample ID: PE2-RSYC10-DC-S011

Lab Sample ID: 160-30729-11

Date Collected: 09/12/18 09:39

Matrix: Solid

Date Received: 09/14/18 08:45

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0208	U	0.0578	0.0578	0.331	0.0494	pCi/g	09/21/18 12:06	10/11/18 05:11	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	86.9		40 - 110					09/21/18 12:06	10/11/18 05:11	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.972		0.187	0.211		0.0458	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Actinium-227	0.612		0.391	0.398		0.206	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Bismuth-212	-0.269	U	0.501	0.501		0.557	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Bismuth-214	0.526		0.113	0.125		0.0419	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Cesium-137	-0.00149	U	0.0505	0.0505	0.0700	0.0415	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Cobalt-60	-0.0416	U	0.0997	0.0998	0.200	0.0481	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Lead-210	0.664	U	1.46	1.46		1.18	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Lead-212	0.694		0.0908	0.128		0.0395	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Lead-214	0.693		0.0952	0.119		0.0472	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Potassium-40	16.2		1.49	2.23		0.197	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Protactinium-231	0.000	U	0.500	0.500		1.98	pCi/g	09/18/18 13:54	10/09/18 07:52	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Client Sample ID: PE2-RSYC10-DC-S011

Lab Sample ID: 160-30729-11

Date Collected: 09/12/18 09:39

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.526		0.113	0.125	0.700	0.0419	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Radium-228	0.972		0.187	0.211		0.0458	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Thallium-208	0.242		0.0595	0.0645		0.0209	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Thorium-228	0.694		0.0908	0.128		0.0395	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Thorium-232	0.972		0.187	0.211		0.0458	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Thorium-234	0.574		0.444	0.448		0.326	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Uranium-235	0.0521	U	0.321	0.321		0.342	pCi/g	09/18/18 13:54	10/09/18 07:52	1
Uranium-238	0.574		0.444	0.448		0.326	pCi/g	09/18/18 13:54	10/09/18 07:52	1

Client Sample ID: PE2-RSYC10-DC-S012

Lab Sample ID: 160-30729-12

Date Collected: 09/12/18 09:46

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.941		0.194	0.217		0.0295	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Actinium-227	0.225	U	0.618	0.619		0.359	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Bismuth-212	0.443	U	1.11	1.11		0.891	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Bismuth-214	0.605		0.130	0.144		0.0370	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Cesium-137	-0.0626	U	0.138	0.138	0.0700	0.0578	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Cobalt-60	0.0153	U	0.0943	0.0943	0.200	0.0475	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Lead-210	-1.05	U	2.27	2.27		1.84	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Lead-212	0.927		0.121	0.171		0.0523	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Lead-214	0.623		0.117	0.134		0.0654	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Potassium-40	16.7		1.88	2.54		0.208	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Protactinium-231	0.197	U	3.00	3.00		2.47	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Radium-226	0.605		0.130	0.144	0.700	0.0370	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Radium-228	0.941		0.194	0.217		0.0295	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Thallium-208	0.319		0.0686	0.0762		0.0181	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Thorium-228	0.927		0.121	0.171		0.0523	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Thorium-232	0.941		0.194	0.217		0.0295	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Thorium-234	0.000828	U	0.000864	0.000869		1.26	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Uranium-235	-0.256	U	0.256	0.257		0.503	pCi/g	09/18/18 13:54	10/09/18 07:54	1
Uranium-238	0.000828	U	0.000864	0.000869		1.26	pCi/g	09/18/18 13:54	10/09/18 07:54	1

Client Sample ID: PE2-RSYC10-DC-S013

Lab Sample ID: 160-30729-13

Date Collected: 09/12/18 09:52

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.563		0.234	0.241		0.188	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Actinium-227	-0.0189	U	0.0865	0.0865		0.519	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Bismuth-212	0.412	U	0.723	0.724		0.537	pCi/g	09/18/18 13:54	10/09/18 07:53	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Client Sample ID: PE2-RSYC10-DC-S013

Lab Sample ID: 160-30729-13

Date Collected: 09/12/18 09:52

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	0.521		0.146	0.155		0.0588	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Cesium-137	-0.0310	U	0.0945	0.0945	0.0700	0.0919	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Cobalt-60	0.0296	U	0.0850	0.0850	0.200	0.0422	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Lead-210	0.149	U	1.86	1.86		1.30	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Lead-212	0.649		0.120	0.147		0.0511	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Lead-214	0.634		0.145	0.160		0.0691	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Potassium-40	13.4		2.04	2.46		0.305	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Protactinium-231	0.000	U	0.364	0.364		2.74	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Radium-226	0.521		0.146	0.155	0.700	0.0588	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Radium-228	0.563		0.234	0.241		0.188	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Thallium-208	0.235		0.0894	0.0927		0.0371	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Thorium-228	0.649		0.120	0.147		0.0511	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Thorium-232	0.563		0.234	0.241		0.188	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Thorium-234	0.906		0.587	0.596		0.466	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Uranium-235	0.129	U	0.442	0.442		0.359	pCi/g	09/18/18 13:54	10/09/18 07:53	1
Uranium-238	0.906		0.587	0.596		0.466	pCi/g	09/18/18 13:54	10/09/18 07:53	1

Client Sample ID: PE2-RSYC10-DC-S014

Lab Sample ID: 160-30729-14

Date Collected: 09/12/18 09:59

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.884		0.182	0.203		0.0589	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Actinium-227	0.284	U	0.571	0.572		0.332	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Bismuth-212	0.169	U	0.762	0.762		0.617	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Bismuth-214	0.654		0.118	0.137		0.0528	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Cesium-137	0.0202	U	0.0548	0.0549	0.0700	0.0437	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Cobalt-60	-0.00785	U	0.0541	0.0541	0.200	0.0264	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Lead-210	1.00		0.860	0.868		0.557	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Lead-212	0.772		0.0981	0.140		0.0438	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Lead-214	0.677		0.101	0.123		0.0442	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Potassium-40	17.1		1.54	2.33		0.202	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Protactinium-231	0.000	U	0.512	0.512		2.08	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Radium-226	0.654		0.118	0.137	0.700	0.0528	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Radium-228	0.884		0.182	0.203		0.0589	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Thallium-208	0.332		0.0648	0.0734		0.0214	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Thorium-228	0.772		0.0981	0.140		0.0438	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Thorium-232	0.884		0.182	0.203		0.0589	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Thorium-234	-0.364	U	0.473	0.475		0.895	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Uranium-235	0.114	U	0.231	0.231		0.427	pCi/g	09/18/18 13:54	10/09/18 08:38	1
Uranium-238	-0.364	U	0.473	0.475		0.895	pCi/g	09/18/18 13:54	10/09/18 08:38	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Client Sample ID: PE2-RSYC10-DC-S015

Lab Sample ID: 160-30729-15

Date Collected: 09/12/18 10:08

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.806		0.254	0.266		0.108	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Actinium-227	-0.365	U	0.772	0.773		0.470	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Bismuth-212	0.459	U	0.803	0.804		0.624	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Bismuth-214	0.885		0.180	0.201		0.0554	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Cesium-137	-0.0113	U	0.0619	0.0619	0.0700	0.0500	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Cobalt-60	0.0168	U	0.0745	0.0746	0.200	0.0360	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Lead-210	0.390	U	1.40	1.40		1.00	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Lead-212	0.798		0.117	0.144		0.0541	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Lead-214	0.899		0.192	0.212		0.0709	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Potassium-40	16.8		1.76	2.44		0.108	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Protactinium-231	-1.04	U	3.74	3.75		3.06	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Radium-226	0.885		0.180	0.201	0.700	0.0554	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Radium-228	0.806		0.254	0.266		0.108	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Thallium-208	0.330		0.0678	0.0756		0.0159	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Thorium-228	0.798		0.117	0.144		0.0541	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Thorium-232	0.806		0.254	0.266		0.108	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Thorium-234	1.15		0.731	0.742		0.500	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Uranium-235	0.313		0.247	0.249		0.146	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Uranium-238	1.15		0.731	0.742		0.500	pCi/g	09/18/18 13:54	10/09/18 08:40	1

Client Sample ID: PE2-RSYC10-DC-S016

Lab Sample ID: 160-30729-16

Date Collected: 09/12/18 10:19

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.960		0.182	0.207		0.0328	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Actinium-227	0.181	U	0.630	0.630		0.384	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Bismuth-212	-0.314	U	0.814	0.814		0.705	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Bismuth-214	0.782		0.164	0.183		0.0487	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Cesium-137	-0.00365	U	0.0689	0.0689	0.0700	0.0564	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Cobalt-60	0.000693	U	0.0848	0.0848	0.200	0.0437	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Lead-210	1.34		1.49	1.49		0.901	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Lead-212	0.655		0.121	0.148		0.0652	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Lead-214	0.638		0.141	0.156		0.0560	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Potassium-40	14.8		1.85	2.40		0.135	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Protactinium-231	0.0000004	U	3.22	3.22		2.65	pCi/g	09/18/18 13:54	10/09/18 08:39	1
	40									
Radium-226	0.782		0.164	0.183	0.700	0.0487	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Radium-228	0.960		0.182	0.207		0.0328	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Thallium-208	0.253		0.0785	0.0827		0.0310	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Thorium-228	0.655		0.121	0.148		0.0652	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Thorium-232	0.960		0.182	0.207		0.0328	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Thorium-234	0.0590	U	0.622	0.622		0.507	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Uranium-235	0.111	U	0.255	0.255		0.496	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Uranium-238	0.0590	U	0.622	0.622		0.507	pCi/g	09/18/18 13:54	10/09/18 08:39	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Client Sample ID: PE2-RSYC10-DC-S017

Lab Sample ID: 160-30729-17

Date Collected: 09/12/18 10:26

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.854		0.168	0.189		0.0509	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Actinium-227	-0.267	U	0.473	0.474		0.430	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Bismuth-212	-0.506	U	0.942	0.944		0.743	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Bismuth-214	0.743		0.174	0.190		0.0681	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Cesium-137	0.0113	U	0.0427	0.0427	0.0700	0.0338	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Cobalt-60	0.0229	U	0.0673	0.0674	0.200	0.0330	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Lead-210	0.618	U	1.49	1.49		1.00	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Lead-212	0.753		0.116	0.151		0.0570	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Lead-214	0.796		0.157	0.177		0.0646	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Potassium-40	18.1		1.81	2.59		0.262	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Protactinium-231	-0.425	U	2.94	2.94		2.41	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Radium-226	0.743		0.174	0.190	0.700	0.0681	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Radium-228	0.854		0.168	0.189		0.0509	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Thallium-208	0.262		0.0690	0.0741		0.0259	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Thorium-228	0.753		0.116	0.151		0.0570	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Thorium-232	0.854		0.168	0.189		0.0509	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Thorium-234	0.570		0.579	0.583		0.448	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Uranium-235	0.138	U	0.375	0.376		0.325	pCi/g	09/18/18 13:54	10/09/18 08:40	1
Uranium-238	0.570		0.579	0.583		0.448	pCi/g	09/18/18 13:54	10/09/18 08:40	1

Client Sample ID: PE2-RSYC10-DC-S018

Lab Sample ID: 160-30729-18

Date Collected: 09/12/18 10:34

Matrix: Solid

Date Received: 09/14/18 08:45

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.906		0.202	0.222		0.0401	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Actinium-227	-0.554	U	1.05	1.05		0.635	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Bismuth-212	2.07		0.681	0.713		0.130	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Bismuth-214	0.698		0.202	0.214		0.0841	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Cesium-137	-0.0615	U	0.176	0.176	0.0700	0.0786	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Cobalt-60	0.0206	U	0.0773	0.0773	0.200	0.0523	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Lead-210	2.14		2.10	2.11		1.31	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Lead-212	0.693		0.136	0.154		0.0691	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Lead-214	0.872		0.168	0.190		0.0512	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Potassium-40	14.6		2.05	2.53		0.424	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Protactinium-231	0.996	U	3.74	3.74		3.05	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Radium-226	0.698		0.202	0.214	0.700	0.0841	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Radium-228	0.906		0.202	0.222		0.0401	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Thallium-208	0.288		0.0927	0.0972		0.0351	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Thorium-228	0.693		0.136	0.154		0.0691	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Thorium-232	0.906		0.202	0.222		0.0401	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Thorium-234	1.09		0.741	0.751		0.639	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Uranium-235	0.116	U	0.251	0.251		0.671	pCi/g	09/18/18 13:54	10/09/18 08:39	1
Uranium-238	1.09		0.741	0.751		0.639	pCi/g	09/18/18 13:54	10/09/18 08:39	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-390792/8-A

Matrix: Solid

Analysis Batch: 394286

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 390792

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.03055	U	0.0688	0.0688	0.331	0.0540	pCi/g	09/21/18 12:06	10/11/18 05:11	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	80.2		40 - 110	09/21/18 12:06	10/11/18 05:11	1

Lab Sample ID: LCS 160-390792/1-A

Matrix: Solid

Analysis Batch: 394286

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 390792

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec.	Limits
Total Beta Strontium	8.18	7.553		0.617	0.331	0.0509	pCi/g	92	75 - 125

Carrier	LCS %Yield	LCS Qualifier	Limits
Sr Carrier	85.5		40 - 110

Lab Sample ID: 160-30729-1 DU

Matrix: Solid

Analysis Batch: 394286

Client Sample ID: PE2-RSYC10-DC-S001

Prep Type: Total/NA

Prep Batch: 390792

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	Limit
Total Beta Strontium	0.00911	U	0.02768	U	0.0623	0.331	0.0488	pCi/g	0.15	1

Carrier	DU %Yield	DU Qualifier	Limits
Sr Carrier	87.7		40 - 110

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-390009/1-A

Matrix: Solid

Analysis Batch: 393783

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 390009

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.05815		0.0429	0.0433		0.0546	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Actinium-227	0.1159	U	0.268	0.268		0.263	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Bismuth-212	-0.5202	U	0.980	0.982		0.740	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Bismuth-214	-0.1230	U	0.162	0.163		0.276	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Cesium-137	-0.02932	U	0.102	0.102	0.0700	0.0622	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Cobalt-60	-0.01870	U	0.0771	0.0771	0.200	0.0534	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Lead-210	-0.4501	U	1.39	1.39		1.03	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Lead-212	-0.07590	U	0.106	0.106		0.117	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Lead-214	0.004939	U	0.0619	0.0619		0.0864	pCi/g	09/18/18 13:54	10/09/18 05:26	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-390009/1-A

Matrix: Solid

Analysis Batch: 393783

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 390009

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Potassium-40	0.4680		0.635	0.637		0.386	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Protactinium-231	0.0000	U	0.266	0.266		1.96	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Radium-226	-0.1230	U	0.162	0.163	0.700	0.276	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Radium-228	0.05815		0.0429	0.0433		0.0546	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Thallium-208	0.002470	U	0.00501	0.00502		0.0391	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Thorium-228	-0.07590	U	0.106	0.106		0.117	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Thorium-232	0.05815		0.0429	0.0433		0.0546	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Thorium-234	-0.7492	U	0.529	0.535		0.622	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Uranium-235	-0.02314	U	0.198	0.198		0.165	pCi/g	09/18/18 13:54	10/09/18 05:26	1
Uranium-238	-0.7492	U	0.529	0.535		0.622	pCi/g	09/18/18 13:54	10/09/18 05:26	1

Lab Sample ID: LCS 160-390009/2-A

Matrix: Solid

Analysis Batch: 393779

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 390009

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Americium-241	96.8	93.64		9.87		0.623	pCi/g	97	87 - 116
Cesium-137	28.1	26.03		2.80	0.0700	0.175	pCi/g	93	87 - 120
Cobalt-60	12.6	12.37		1.31	0.200	0.0409	pCi/g	98	87 - 115

Lab Sample ID: 160-30729-1 DU

Matrix: Solid

Analysis Batch: 393783

Client Sample ID: PE2-RSYC10-DC-S001

Prep Type: Total/NA

Prep Batch: 390009

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
Actinium 228	0.622		0.7580		0.227		0.0363	pCi/g	0.29	1
Actinium-227	-0.392	U	0.1402	U	0.436		0.413	pCi/g	0.44	1
Bismuth-212	0.000	U	-0.01650	U	0.857		0.705	pCi/g	0.01	1
Bismuth-214	0.705		0.4668		0.151		0.0719	pCi/g	0.75	1
Cesium-137	-0.0295	U	0.01899	U	0.0802	0.0700	0.0643	pCi/g	0.32	1
Cobalt-60	0.0366		0.01624	U	0.0350	0.200	0.0487	pCi/g	0.25	1
Lead-210	-1.01	U	1.324		1.11		0.725	pCi/g	0.79	1
Lead-212	0.738		0.7197		0.151		0.0528	pCi/g	0.06	1
Lead-214	0.544		0.6519		0.145		0.0616	pCi/g	0.34	1
Potassium-40	16.4		17.55		2.78		0.256	pCi/g	0.23	1
Protactinium-231	0.000	U	-0.8457	U	3.05		2.48	pCi/g	0.24	1
Radium-226	0.705		0.4668		0.151	0.700	0.0719	pCi/g	0.75	1
Radium-228	0.622		0.7580		0.227		0.0363	pCi/g	0.29	1
Thallium-208	0.286		0.3527		0.0876		0.0192	pCi/g	0.41	1
Thorium-228	0.738		0.7197		0.151		0.0528	pCi/g	0.06	1
Thorium-232	0.622		0.7580		0.227		0.0363	pCi/g	0.29	1
Thorium-234	0.583		0.7198		0.628		0.428	pCi/g	0.11	1
Uranium-235	-0.0440	U	0.09143	U	0.403		0.361	pCi/g	0.18	1
Uranium-238	0.583		0.7198		0.628		0.428	pCi/g	0.11	1

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Rad

Leach Batch: 389243

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30729-1	PE2-RSYC10-DC-S001	Total/NA	Solid	Dry and Grind	
160-30729-2	PE2-RSYC10-DC-S002	Total/NA	Solid	Dry and Grind	
160-30729-3	PE2-RSYC10-DC-S003	Total/NA	Solid	Dry and Grind	
160-30729-4	PE2-RSYC10-DC-S004	Total/NA	Solid	Dry and Grind	
160-30729-5	PE2-RSYC10-DC-S005	Total/NA	Solid	Dry and Grind	
160-30729-6	PE2-RSYC10-DC-S006	Total/NA	Solid	Dry and Grind	
160-30729-7	PE2-RSYC10-DC-S007	Total/NA	Solid	Dry and Grind	
160-30729-8	PE2-RSYC10-DC-S008	Total/NA	Solid	Dry and Grind	
160-30729-9	PE2-RSYC10-DC-S009	Total/NA	Solid	Dry and Grind	
160-30729-10	PE2-RSYC10-DC-S010	Total/NA	Solid	Dry and Grind	
160-30729-11	PE2-RSYC10-DC-S011	Total/NA	Solid	Dry and Grind	
160-30729-12	PE2-RSYC10-DC-S012	Total/NA	Solid	Dry and Grind	
160-30729-13	PE2-RSYC10-DC-S013	Total/NA	Solid	Dry and Grind	
160-30729-14	PE2-RSYC10-DC-S014	Total/NA	Solid	Dry and Grind	
160-30729-15	PE2-RSYC10-DC-S015	Total/NA	Solid	Dry and Grind	
160-30729-16	PE2-RSYC10-DC-S016	Total/NA	Solid	Dry and Grind	
160-30729-17	PE2-RSYC10-DC-S017	Total/NA	Solid	Dry and Grind	
160-30729-18	PE2-RSYC10-DC-S018	Total/NA	Solid	Dry and Grind	
160-30729-1 DU	PE2-RSYC10-DC-S001	Total/NA	Solid	Dry and Grind	

Prep Batch: 390009

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30729-1	PE2-RSYC10-DC-S001	Total/NA	Solid	Fill_Geo-21	389243
160-30729-2	PE2-RSYC10-DC-S002	Total/NA	Solid	Fill_Geo-21	389243
160-30729-3	PE2-RSYC10-DC-S003	Total/NA	Solid	Fill_Geo-21	389243
160-30729-4	PE2-RSYC10-DC-S004	Total/NA	Solid	Fill_Geo-21	389243
160-30729-5	PE2-RSYC10-DC-S005	Total/NA	Solid	Fill_Geo-21	389243
160-30729-6	PE2-RSYC10-DC-S006	Total/NA	Solid	Fill_Geo-21	389243
160-30729-7	PE2-RSYC10-DC-S007	Total/NA	Solid	Fill_Geo-21	389243
160-30729-8	PE2-RSYC10-DC-S008	Total/NA	Solid	Fill_Geo-21	389243
160-30729-9	PE2-RSYC10-DC-S009	Total/NA	Solid	Fill_Geo-21	389243
160-30729-10	PE2-RSYC10-DC-S010	Total/NA	Solid	Fill_Geo-21	389243
160-30729-11	PE2-RSYC10-DC-S011	Total/NA	Solid	Fill_Geo-21	389243
160-30729-12	PE2-RSYC10-DC-S012	Total/NA	Solid	Fill_Geo-21	389243
160-30729-13	PE2-RSYC10-DC-S013	Total/NA	Solid	Fill_Geo-21	389243
160-30729-14	PE2-RSYC10-DC-S014	Total/NA	Solid	Fill_Geo-21	389243
160-30729-15	PE2-RSYC10-DC-S015	Total/NA	Solid	Fill_Geo-21	389243
160-30729-16	PE2-RSYC10-DC-S016	Total/NA	Solid	Fill_Geo-21	389243
160-30729-17	PE2-RSYC10-DC-S017	Total/NA	Solid	Fill_Geo-21	389243
160-30729-18	PE2-RSYC10-DC-S018	Total/NA	Solid	Fill_Geo-21	389243
MB 160-390009/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-390009/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-30729-1 DU	PE2-RSYC10-DC-S001	Total/NA	Solid	Fill_Geo-21	389243

Prep Batch: 390792

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30729-1	PE2-RSYC10-DC-S001	Total/NA	Solid	DPS-0	389243
160-30729-11	PE2-RSYC10-DC-S011	Total/NA	Solid	DPS-0	389243
MB 160-390792/8-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-390792/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	
160-30729-1 DU	PE2-RSYC10-DC-S001	Total/NA	Solid	DPS-0	389243

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30729-2

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)							
Lab Sample ID	Client Sample ID	Sr Carrier (40-110)							
160-30729-1	PE2-RSYC10-DC-S001	86.2							
160-30729-1 DU	PE2-RSYC10-DC-S001	87.7							
160-30729-11	PE2-RSYC10-DC-S011	86.9							
LCS 160-390792/1-A	Lab Control Sample	85.5							
MB 160-390792/8-A	Method Blank	80.2							
Tracer/Carrier Legend									
Sr Carrier = Sr Carrier									

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-31053-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

Rhonda Ridenhower

Authorized for release by:

10/29/2018 2:27:33 PM

Rhonda Ridenhower, Manager of Project Management
(314)298-8566

rhonda.ridenhower@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Job ID: 160-31053-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-31053-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup
Method 3620C: Florisil Cleanup
Method 3630C: Silica Gel Cleanup
Method 3640A: Gel-Permeation Cleanup
Method 3650B: Acid-Base Partition Cleanup
Method 3660B: Sulfur Cleanup

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Job ID: 160-31053-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Method 3665A: Sulfuric Acid/Permanganate Cleanup

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 10/02/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 19.0 C.

TOTAL BETA STRONTIUM (GFPC)

Sample PE2-RSYC10-DC-B-S001 (160-31053-1) was analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 10/02/2018, prepared on 10/07/2018 and analyzed on 10/25/2018.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: PE2-RSYC10-DC-B-S001 (160-31053-1). The samples contained detritus material and rocks of varying sizes.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples PE2-RSYC10-DC-B-S001 (160-31053-1), PE2-RSYC10-DC-B-S002 (160-31053-2), PE2-RSYC10-DC-B-S003 (160-31053-3), PE2-RSYC10-DC-B-S004 (160-31053-4), PE2-RSYC10-DC-B-S005 (160-31053-5), PE2-RSYC10-DC-B-S006 (160-31053-6) and PE2-RSYC10-DC-B-S007 (160-31053-7) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 10/02/2018, prepared on 10/04/2018 and analyzed on 10/25/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

PE2-RSYC10-DC-B-S002 (160-31053-2) and PE2-RSYC10-DC-B-S004 (160-31053-4)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-31053-2

Login Number: 31053**List Source: TestAmerica St. Louis****List Number: 1****Creator: Press, Nicholas B**

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-31053-1	PE2-RSYC10-DC-B-S001	Solid	09/26/18 10:45	10/02/18 08:40
160-31053-2	PE2-RSYC10-DC-B-S002	Solid	09/26/18 10:51	10/02/18 08:40
160-31053-3	PE2-RSYC10-DC-B-S003	Solid	09/26/18 10:57	10/02/18 08:40
160-31053-4	PE2-RSYC10-DC-B-S004	Solid	09/26/18 11:03	10/02/18 08:40
160-31053-5	PE2-RSYC10-DC-B-S005	Solid	09/26/18 11:10	10/02/18 08:40
160-31053-6	PE2-RSYC10-DC-B-S006	Solid	09/26/18 11:16	10/02/18 08:40
160-31053-7	PE2-RSYC10-DC-B-S007	Solid	09/26/18 11:23	10/02/18 08:40

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Client Sample ID: PE2-RSYC10-DC-B-S001

Date Collected: 09/26/18 10:45

Date Received: 10/02/18 08:40

Lab Sample ID: 160-31053-1

Matrix: Solid

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.00447	U	0.0593	0.0593	0.331	0.0483	pCi/g	10/07/18 13:14	10/25/18 05:45	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	87.3		40 - 110					10/07/18 13:14	10/25/18 05:45	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.818		0.182	0.200		0.0615	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Actinium-227	0.200	U	0.338	0.339		0.294	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Bismuth-212	0.201	U	0.662	0.663		0.531	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Bismuth-214	0.633		0.128	0.144		0.0430	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Cesium-137	-0.00773	U	0.0607	0.0607	0.0700	0.0330	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Cobalt-60	0.0190	U	0.0325	0.0325	0.200	0.0329	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Lead-210	0.563	U	1.42	1.43		1.15	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Lead-212	0.796		0.0971	0.142		0.0400	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Lead-214	0.690		0.109	0.130		0.0507	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Potassium-40	16.7		1.54	2.30		0.236	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Protactinium-231	0.360	U	1.33	1.33		2.09	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Radium-226	0.633		0.128	0.144	0.700	0.0430	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Radium-228	0.818		0.182	0.200		0.0615	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Thallium-208	0.257		0.0595	0.0652		0.0212	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Thorium-228	0.796		0.0971	0.142		0.0400	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Thorium-232	0.818		0.182	0.200		0.0615	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Thorium-234	-0.370	U	0.471	0.473		0.985	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Uranium-235	0.0427	U	0.247	0.247		0.456	pCi/g	10/04/18 12:19	10/25/18 17:21	1
Uranium-238	-0.370	U	0.471	0.473		0.985	pCi/g	10/04/18 12:19	10/25/18 17:21	1

Client Sample ID: PE2-RSYC10-DC-B-S002

Date Collected: 09/26/18 10:51

Date Received: 10/02/18 08:40

Lab Sample ID: 160-31053-2

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.788		0.177	0.194		0.0288	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Actinium-227	0.197	U	0.571	0.572		0.390	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Bismuth-212	0.431	U	0.802	0.804		0.625	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Bismuth-214	0.861		0.153	0.177		0.0367	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Cesium-137	-0.0777	U	0.0917	0.0920	0.0700	0.0780	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Cobalt-60	-0.00286	U	0.0930	0.0930	0.200	0.0499	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Lead-210	-0.369	U	1.03	1.03		1.59	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Lead-212	0.769		0.110	0.148		0.0489	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Lead-214	0.636		0.150	0.164		0.0568	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Potassium-40	17.7		1.91	2.63		0.217	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Protactinium-231	0.756	U	2.16	2.16		2.36	pCi/g	10/04/18 12:19	10/25/18 19:09	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Client Sample ID: PE2-RSYC10-DC-B-S002

Lab Sample ID: 160-31053-2

Date Collected: 09/26/18 10:51

Matrix: Solid

Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.861		0.153	0.177	0.700	0.0367	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Radium-228	0.788		0.177	0.194		0.0288	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Thallium-208	0.313		0.0848	0.0908		0.0344	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Thorium-228	0.769		0.110	0.148		0.0489	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Thorium-232	0.788		0.177	0.194		0.0288	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Thorium-234	0.815		0.624	0.631		0.479	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Uranium-235	-0.243	U	0.338	0.339		0.471	pCi/g	10/04/18 12:19	10/25/18 19:09	1
Uranium-238	0.815		0.624	0.631		0.479	pCi/g	10/04/18 12:19	10/25/18 19:09	1

Client Sample ID: PE2-RSYC10-DC-B-S003

Lab Sample ID: 160-31053-3

Date Collected: 09/26/18 10:57

Matrix: Solid

Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.786		0.179	0.196		0.0943	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Actinium-227	0.00849	U	0.565	0.565		0.337	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Bismuth-212	0.296	U	0.674	0.674		0.535	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Bismuth-214	0.702		0.142	0.160		0.0475	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Cesium-137	0.0153	U	0.0534	0.0534	0.0700	0.0429	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Cobalt-60	0.00933	U	0.0431	0.0431	0.200	0.0259	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Lead-210	-0.767	U	0.873	0.878		1.11	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Lead-212	0.759		0.0920	0.135		0.0366	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Lead-214	0.794		0.134	0.157		0.0472	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Potassium-40	16.2		1.63	2.33		0.359	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Protactinium-231	0.000	U	0.611	0.611		2.03	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Radium-226	0.702		0.142	0.160	0.700	0.0475	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Radium-228	0.786		0.179	0.196		0.0943	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Thallium-208	0.263		0.0566	0.0629		0.0176	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Thorium-228	0.759		0.0920	0.135		0.0366	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Thorium-232	0.786		0.179	0.196		0.0943	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Thorium-234	0.632		0.444	0.450		0.337	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Uranium-235	0.242	U	0.369	0.370		0.442	pCi/g	10/04/18 12:19	10/25/18 19:10	1
Uranium-238	0.632		0.444	0.450		0.337	pCi/g	10/04/18 12:19	10/25/18 19:10	1

Client Sample ID: PE2-RSYC10-DC-B-S004

Lab Sample ID: 160-31053-4

Date Collected: 09/26/18 11:03

Matrix: Solid

Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	1.12		0.306	0.326		0.0832	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Actinium-227	0.250	U	0.517	0.518		0.475	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Bismuth-212	-0.0817	U	1.11	1.11		0.949	pCi/g	10/04/18 12:19	10/25/18 20:09	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Client Sample ID: PE2-RSYC10-DC-B-S004

Lab Sample ID: 160-31053-4

Date Collected: 09/26/18 11:03

Matrix: Solid

Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	1.06		0.202	0.230		0.0645	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Cesium-137	-0.0465	U	0.120	0.120	0.0700	0.0719	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Cobalt-60	-0.0216	U	0.126	0.126	0.200	0.0608	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Lead-210	1.57		1.21	1.23		0.772	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Lead-212	0.827		0.124	0.164		0.0530	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Lead-214	1.18		0.153	0.196		0.0622	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Potassium-40	13.6		1.86	2.32		0.265	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Protactinium-231	-0.655	U	3.69	3.69		3.03	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Radium-226	1.06		0.202	0.230	0.700	0.0645	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Radium-228	1.12		0.306	0.326		0.0832	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Thallium-208	0.296		0.0931	0.0981		0.0350	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Thorium-228	0.827		0.124	0.164		0.0530	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Thorium-232	1.12		0.306	0.326		0.0832	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Thorium-234	0.594		0.737	0.740		0.580	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Uranium-235	0.236	U	0.442	0.443		0.548	pCi/g	10/04/18 12:19	10/25/18 20:09	1
Uranium-238	0.594		0.737	0.740		0.580	pCi/g	10/04/18 12:19	10/25/18 20:09	1

Client Sample ID: PE2-RSYC10-DC-B-S005

Lab Sample ID: 160-31053-5

Date Collected: 09/26/18 11:10

Matrix: Solid

Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.727		0.177	0.192		0.114	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Actinium-227	-0.0147	U	0.0262	0.0262		0.376	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Bismuth-212	-0.0592	U	0.843	0.843		0.691	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Bismuth-214	0.698		0.145	0.162		0.0532	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Cesium-137	0.0372		0.0435	0.0437	0.0700	0.0325	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Cobalt-60	0.0231		0.0411	0.0412	0.200	0.0186	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Lead-210	-0.178	U	1.18	1.18		1.24	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Lead-212	0.709		0.0931	0.131		0.0417	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Lead-214	0.666		0.112	0.132		0.0619	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Potassium-40	18.4		1.59	2.47		0.230	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Protactinium-231	0.120	U	1.39	1.39		2.14	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Radium-226	0.698		0.145	0.162	0.700	0.0532	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Radium-228	0.727		0.177	0.192		0.114	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Thallium-208	0.260		0.0638	0.0693		0.0237	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Thorium-228	0.709		0.0931	0.131		0.0417	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Thorium-232	0.727		0.177	0.192		0.114	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Thorium-234	0.729		0.408	0.416		0.321	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Uranium-235	0.000	U	0.231	0.231		0.422	pCi/g	10/04/18 12:19	10/25/18 20:03	1
Uranium-238	0.729		0.408	0.416		0.321	pCi/g	10/04/18 12:19	10/25/18 20:03	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Client Sample ID: PE2-RSYC10-DC-B-S006

Lab Sample ID: 160-31053-6

Date Collected: 09/26/18 11:16

Matrix: Solid

Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	1.01		0.184	0.210		0.0734	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Actinium-227	-0.330	U	0.879	0.880		0.513	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Bismuth-212	1.31		0.592	0.608		0.203	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Bismuth-214	0.830		0.161	0.182		0.0395	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Cesium-137	0.0213	U	0.0852	0.0852	0.0700	0.0683	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Cobalt-60	-0.0394	U	0.101	0.101	0.200	0.0602	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Lead-210	0.927	U	2.07	2.07		1.67	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Lead-212	0.805		0.122	0.161		0.0522	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Lead-214	1.01		0.184	0.212		0.0641	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Potassium-40	14.3		1.90	2.40		0.262	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Protactinium-231	0.774	U	2.68	2.68		2.89	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Radium-226	0.830		0.161	0.182	0.700	0.0395	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Radium-228	1.01		0.184	0.210		0.0734	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Thallium-208	0.285		0.0723	0.0781		0.0223	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Thorium-228	0.805		0.122	0.161		0.0522	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Thorium-232	1.01		0.184	0.210		0.0734	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Thorium-234	0.865		0.663	0.670		0.581	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Uranium-235	0.0418	U	0.0395	0.0397		0.506	pCi/g	10/04/18 12:19	10/25/18 20:43	1
Uranium-238	0.865		0.663	0.670		0.581	pCi/g	10/04/18 12:19	10/25/18 20:43	1

Client Sample ID: PE2-RSYC10-DC-B-S007

Lab Sample ID: 160-31053-7

Date Collected: 09/26/18 11:23

Matrix: Solid

Date Received: 10/02/18 08:40

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.778		0.141	0.162		0.0645	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Actinium-227	-0.331	U	0.452	0.454		0.367	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Bismuth-212	-0.190	U	0.727	0.727		0.586	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Bismuth-214	0.643		0.120	0.137		0.0404	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Cesium-137	0.0287	U	0.0467	0.0468	0.0700	0.0360	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Cobalt-60	0.00185	U	0.0558	0.0558	0.200	0.0277	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Lead-210	0.400	U	1.33	1.33		1.08	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Lead-212	0.754		0.0979	0.138		0.0429	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Lead-214	0.650		0.110	0.129		0.0558	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Potassium-40	15.4		1.51	2.18		0.243	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Protactinium-231	0.120	U	1.34	1.34		2.07	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Radium-226	0.643		0.120	0.137	0.700	0.0404	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Radium-228	0.778		0.141	0.162		0.0645	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Thallium-208	0.245		0.0550	0.0606		0.0186	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Thorium-228	0.754		0.0979	0.138		0.0429	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Thorium-232	0.778		0.141	0.162		0.0645	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Thorium-234	-0.431	U	0.507	0.509		1.17	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Uranium-235	-0.0896	U	0.241	0.241		0.429	pCi/g	10/04/18 12:19	10/25/18 20:42	1
Uranium-238	-0.431	U	0.507	0.509		1.17	pCi/g	10/04/18 12:19	10/25/18 20:42	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-393536/14-A

Matrix: Solid

Analysis Batch: 397304

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 393536

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.1546		0.0773	0.0781	0.331	0.0517	pCi/g	10/07/18 13:14	10/25/18 07:00	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	84.2		40 - 110	10/07/18 13:14	10/25/18 07:00	1

Lab Sample ID: LCS 160-393536/1-A

Matrix: Solid

Analysis Batch: 397293

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 393536

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Total Beta Strontium	8.17	8.226		0.666	0.331	0.0650	pCi/g	101	75 - 125

Carrier	LCS %Yield	LCS Qualifier	Limits
Sr Carrier	87.2		40 - 110

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-393084/1-A

Matrix: Solid

Analysis Batch: 397283

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 393084

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.04739	U	0.120	0.120		0.106	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Actinium-227	0.07849	U	0.269	0.270		0.187	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Bismuth-212	-0.05342	U	0.602	0.602		0.447	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Bismuth-214	-0.02917	U	0.0772	0.0773		0.203	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Cesium-137	-0.02932	U	0.0579	0.0580	0.0700	0.0604	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Cobalt-60	-0.03019	U	0.0660	0.0661	0.200	0.0506	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Lead-210	0.4545	U	1.33	1.33		1.06	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Lead-212	-0.02750	U	0.0968	0.0969		0.0872	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Lead-214	-0.09659	U	0.160	0.161		0.110	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Potassium-40	-0.4514	U	0.821	0.823		0.541	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Protactinium-231	0.0000	U	0.770	0.770		1.83	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Radium-226	-0.02917	U	0.0772	0.0773	0.700	0.203	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Radium-228	0.04739	U	0.120	0.120		0.106	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Thallium-208	0.009888	U	0.0296	0.0296		0.0207	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Thorium-228	-0.02750	U	0.0968	0.0969		0.0872	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Thorium-232	0.04739	U	0.120	0.120		0.106	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Thorium-234	0.1620	U	0.489	0.490		0.402	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Uranium-235	0.03111	U	0.353	0.353		0.288	pCi/g	10/04/18 12:19	10/25/18 17:22	1
Uranium-238	0.1620	U	0.489	0.490		0.402	pCi/g	10/04/18 12:19	10/25/18 17:22	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-393084/2-A
Matrix: Solid
Analysis Batch: 397292

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 393084

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Americium-241	96.8	94.98		9.97		0.525	pCi/g	98	87 - 116
Cesium-137	28.1	26.83		2.85	0.0700	0.0996	pCi/g	96	87 - 120
Cobalt-60	12.5	11.94		1.24	0.200	0.0459	pCi/g	95	87 - 115

Lab Sample ID: 160-31053-1 DU
Matrix: Solid
Analysis Batch: 397283

Client Sample ID: PE2-RSYC10-DC-B-S001
Prep Type: Total/NA
Prep Batch: 393084

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
Actinium 228	0.818		0.9292		0.214		0.0758	pCi/g	0.27	1
Actinium-227	0.200	U	0.1556	U	0.484		0.389	pCi/g	0.05	1
Bismuth-212	0.201	U	0.4123	U	0.772		0.596	pCi/g	0.15	1
Bismuth-214	0.633		0.7873		0.181		0.0478	pCi/g	0.47	1
Cesium-137	-0.00773	U	-0.01513	U	0.0733	0.0700	0.0613	pCi/g	0.06	1
Cobalt-60	0.0190	U	0.02080	U	0.0651	0.200	0.0351	pCi/g	0.02	1
Lead-210	0.563	U	-0.1324	U	1.14		1.46	pCi/g	0.27	1
Lead-212	0.796		0.6828		0.141		0.0502	pCi/g	0.40	1
Lead-214	0.690		0.7005		0.138		0.0504	pCi/g	0.04	1
Potassium-40	16.7		17.27		2.64		0.235	pCi/g	0.12	1
Protactinium-231	0.360	U	0.2934	U	1.60		2.47	pCi/g	0.02	1
Radium-226	0.633		0.7873		0.181	0.700	0.0478	pCi/g	0.47	1
Radium-228	0.818		0.9292		0.214		0.0758	pCi/g	0.27	1
Thallium-208	0.257		0.3254		0.0827		0.0242	pCi/g	0.46	1
Thorium-228	0.796		0.6828		0.141		0.0502	pCi/g	0.40	1
Thorium-232	0.818		0.9292		0.214		0.0758	pCi/g	0.27	1
Thorium-234	-0.370	U	0.6345		0.652		0.505	pCi/g	0.89	1
Uranium-235	0.0427	U	0.4540		0.328		0.182	pCi/g	0.71	1
Uranium-238	-0.370	U	0.6345		0.652		0.505	pCi/g	0.89	1

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Rad

Leach Batch: 392588

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-31053-1	PE2-RSYC10-DC-B-S001	Total/NA	Solid	Dry and Grind	
160-31053-2	PE2-RSYC10-DC-B-S002	Total/NA	Solid	Dry and Grind	
160-31053-3	PE2-RSYC10-DC-B-S003	Total/NA	Solid	Dry and Grind	
160-31053-4	PE2-RSYC10-DC-B-S004	Total/NA	Solid	Dry and Grind	
160-31053-5	PE2-RSYC10-DC-B-S005	Total/NA	Solid	Dry and Grind	
160-31053-6	PE2-RSYC10-DC-B-S006	Total/NA	Solid	Dry and Grind	
160-31053-7	PE2-RSYC10-DC-B-S007	Total/NA	Solid	Dry and Grind	
160-31053-1 DU	PE2-RSYC10-DC-B-S001	Total/NA	Solid	Dry and Grind	

Prep Batch: 393084

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-31053-1	PE2-RSYC10-DC-B-S001	Total/NA	Solid	Fill_Geo-21	392588
160-31053-2	PE2-RSYC10-DC-B-S002	Total/NA	Solid	Fill_Geo-21	392588
160-31053-3	PE2-RSYC10-DC-B-S003	Total/NA	Solid	Fill_Geo-21	392588
160-31053-4	PE2-RSYC10-DC-B-S004	Total/NA	Solid	Fill_Geo-21	392588
160-31053-5	PE2-RSYC10-DC-B-S005	Total/NA	Solid	Fill_Geo-21	392588
160-31053-6	PE2-RSYC10-DC-B-S006	Total/NA	Solid	Fill_Geo-21	392588
160-31053-7	PE2-RSYC10-DC-B-S007	Total/NA	Solid	Fill_Geo-21	392588
MB 160-393084/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-393084/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-31053-1 DU	PE2-RSYC10-DC-B-S001	Total/NA	Solid	Fill_Geo-21	392588

Prep Batch: 393536

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-31053-1	PE2-RSYC10-DC-B-S001	Total/NA	Solid	DPS-0	392588
MB 160-393536/14-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-393536/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-31053-2

Prep Type: Total/NA

Matrix: Solid

		Percent Yield (Acceptance Limits)					
Lab Sample ID	Client Sample ID	Sr Carrier (40-110)					
160-31053-1	PE2-RSYC10-DC-B-S001	87.3					
LCS 160-393536/1-A	Lab Control Sample	87.2					
MB 160-393536/14-A	Method Blank	84.2					
Tracer/Carrier Legend							
Sr Carrier = Sr Carrier							